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L'EXPLORATION DE LA MER

RAPPORTS

ET

PROCÈS-VERBAUX DES RÉUNIONS

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(MAI-JUIN — 1930)

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VINGT-TROISIÈME RÉUNION

COPENHAGUE — MAI—JUIN 1930

BUREAU DU CONSEIL:

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M. Otto Pettersson, Vice-Président du Conseil.
M. J. Hjort, Vice-Président du Conseil.
M. Théodore Tissier, Vice-Président du Conseil.
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Mr. David T. Jones, C. B. E., F. R. S. E., Chairman of the Fishery Board for Scotland, *Edinburgh.*

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Italie: *M. le Professeur G. Magrini, *Stra* (Venise).

*S. E. l'Amiral Paolo Thaon di Revel, *Rome.*

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Norvège: M. le Professeur Johan Hjort, à l'Université, *Oslo.*
*M. S. K. Asserson, Directeur des Pêches, *Bergen.*
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**M. le Dr. E. van Everdingen, Professeur à l'Université d'Utrecht, Directeur en Chef de l'Institut Météorologique Royal des Pays-Bas, *De Bilt.*

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M. le Dr. Alfredo Ramalho, Aquario Vasco da Gama, *Dafundo.*

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Expert: M. le Dr. Arvid R. Molander, *Lysekil.*

* Empêché d'assister à la réunion.
** A remplacé M. van Riel.

AGENDA

for the twentythird meeting of the International Council for the Exploration of the Sea.

1. Opening of the Proceedings by the President.
2. Report as to the present participation.
3. Administrative Report.
4. Final Approval of the Accounts for 1928—1929.
5. Statement of Accounts for 1929—1930.
6. Arrangements for Scientific Meetings and adjustments, if any, of the circulated programmes of proceedings.
7. Consideration of Reports and Programmes of the Committees.
8. Estimates for the financial year 1930—1931.
9. Nomination of the members of the Bureau, and the Finance Committee, and the Editorial Committee, and of the Editors, etc.
10. Time and place for the next Council Meeting.
11. Other business.
12. Conclusion of the Meeting.

REPORT

of

the twentythird Meeting of the Council.

First Sitting: Monday, May 26th, at 11,00 a. m.

The President, Mr. MAURICE, in the chair.
Present: The members and experts (vide list pp. 4—7).

Under **Point 1 of the Agenda** the President formally opened the proceedings in the following words:—

Messieurs les Délégués et Experts,

J'ai l'honneur de déclarer ouverte la 23ième session du Conseil International.

Avant de passer à l'ordre du jour, je vous prie de vous joindre à moi pour saluer la mémoire de quelques anciens collègues récemment décédés.

Le Conseil vieillit, et c'est une des douleurs de la vieillesse d'assister à la mort de ses amis. Ainsi déplorons nous la perte de GUSTAF EKMAN, homme d'affaires, savant, inventeur, bon ami, qui a été associé à nos travaux, ou comme expert, ou comme délégué de son pays à peu près des la création du Conseil.

Grand travailleur, malgré l'exigeance des affaires auxquelles il était associé dans sa ville de Göteborg, il trouvait le moyen de consacrer une grande partie de sa vie à des études hydrologiques, qui étaient pour lui un véritable délassement et auxquelles — nous en avons tous été témoins — il apporta une contribution remarquable.

Nous avons tous profité des résultats de ses études scientifiques, de l'exactitude des apparails qu'il a inventés et de ses bons conseils, mais ce n'est pas seulement le savant que nous regrettons c'est surtout l'homme — l'homme qui joignait à un caractère droit et courageux un esprit sympathique et capable d'amitié.

De tous ses amis je crois que celui qui lui était le plus étroitement lié était notre très cher collègue, OTTO PETTERSSON, auquel, en votre nom, j'adresse l'expression de la sympathie profonde du Conseil, en le priant d'être notre interprète auprès des fils et des filles de notre ami décédé.

Professor PETTERSSON spoke as follow:—

Je suis chargé par les fils de GUSTAF EKMAN de remercier chaleureusement pour l'hommage que M. le Président a voulu offrir à la mémoire de leur père.

The President resumed:—

Un autre deuil a atteint non seulement le Conseil International mais même la science mondiale, par la disparition du grand explorateur et savant, FRIDTJOF NANSEN. Le récit de ses voyages, de ses découvertes appartient déjà à l'histoire et je n'ai pas de

rappeler l'importance de ses tentatives polaires devant vous. NANSEN fut un des fondateurs de l'océanographie moderne; aussi ne devons nous pas être surpris de le trouver apportant sa haute autorité et sa prodigieuse compétence aux travaux du Conseil International, des ses débuts.

Cet énorme esprit s'exerçait dans tous les domaines de la science et de la philosophie; il alliait à son grand savoir un immense désir de soulager les douleurs humaines. De lui plus que de tout autre on peut dire que rien de ce qui était humain ne lui était étranger. Il secondait cette grande bonne volonté par une tenacité remarquable, et à sa vie s'appliquait bien le nom de son fameux navire, le "Fram", c'est-à-dire: "Jusqu'au but".

Je vous prie mon cher collègue, HJORT, d'apporter dans votre pays le témoignage de l'admiration que le Conseil portait à votre grand compatriote.

Professor HJORT spoke as follows:—

Au nom de la Norvège je vous remercie beaucoup, M. le Président.

The President resumed:—

Tandis que l'Océanographie perd ainsi de ses maîtres, la Biologie est aussi en deuil par la disparition du Professeur HEINCKE. Peu de savants ont autant que ce dernier travaillé aussi activement et d'une façon aussi brillante dans le domaine qui constitue le programme même du Conseil International, je veux dire la biologie des poissons comestibles.

HEINCKE est, et restera un des grand maîtres dans la détermination des variations ethniques. Sa "Naturgeschichte des Herings" est un de ces ouvrages universellement connus et qui font partie de la base fondamentale des études que nous poursuivons. Aussi, pendant de longues années le Professeur HEINCKE a-t-il fait partie de notre Conseil. C'est particulièrement à ce titre, que je vous demande, Docteur HEINRICI, de recevoir nos condoléances pour la perte que la mort de HEINCKE fait subir la science allemande.

Dr. HEINRICI spoke as follows:—

Ich sage Dem Herrn Präsidenten den aufrichtigen Dank der Deutschen Wissenschaftlichen Kommission für die ehrenden Worte, mit denen er unseres verstorbenen stellvertretenden Vorsitzenden HEINCKE gedacht hat. Wir verdanken seiner Forscherarbeit ausserordentlich viel und freuen uns der Anerkennung, die seine Mitarbeit in der Internationalen Meeresforschung gefunden hat und der Gewissheit, dass sein Andenken mit dem EKMANS und NANSENS in dieser Gemeinschaft unvergessen sein wird.

The President resumed:—

Ainsi la Suède, la Norvège, l'Allemagne ont à regretter la disparition de grands savants. De même la Grande Bretagne a à déplorer la mort de WEMYSS FULTON. Les travaux de notre compatriote sont connus de tous et autrefois il siégeait souvent parmi nous.

Peu d'entre vous, peut-être, avaient été avertis de la mort de notre ancien collègue, aussi est-il pour moi un pénible devoir de vous annoncer son decès; je suis certain que tous vous associerez votre sympathie à l'évocation de sa mémoire.

En l'honneur de tous ces savants regrettés je vous demande, Messieurs, de vous receuillir en silence.

After an interval of silence the President resumed:—

Au nom du Conseil je salue notre ami, le Docteur ANDERSSON, que nous voyons avec grand plaisir siéger maintenant parmi nous comme délégué de la Suède. De même ai-je le plaisir de souhaiter la bienvenue au professeur VAN EVERDINGEN, qui nous rejoint après une absence trop longue comme délégué des Pays Bas, remplaçant M. VAN RIEL.

Vous connaissez l'amiral DOUGLAS, Directeur du Service Hydrographique de la marine Britannique, par ses travaux cartographiques et pour l'avoir rencontré à notre dernière réunion, à Londres, aussi je crois que je suis votre interprète en lui souhaitant la bienvenue. Je me permets aussi de saluer en votre nom un expert de la grande Bretagne, M. MENZIES, assistant du Service Scientifique du Fishery Board for Scotland, ainsi que le Professeur DEFANT, expert de l'Allemagne, qui est venu ici pour prendre part à la conférence hydrographique. Je crois qu'il n'y a pas d'autres nouveaux experts, et quelques délégués nous manquent, ce que nous regrettons tous.

Je vous propose d'adresser, comme de coutume par télégramme nos hommages d'affectueux respect à sa Majesté le Roi de Danemark.

Enfin je me charge d'adresser en personne au Comte REVENTLOW, Sécretaire du Ministère des Affaires Etrangères nos remerciements pour les mesures que le Gouvernement du Roi a bien voulu prendre pour nous recevoir ici à Christiansborg pour nos séances plénières.

The President then read the following telegram from Prof. SCHMIDT:—

> Désolé ne pouvoir être des vôtres. Exprime tous mes voeux pour Conseil. Amitiés à tous.
> SCHMIDT, Méditerranée.

M. THÉODORE TISSIER spoke as follows:—

Messieurs et chers Collègues,

La 23e session du Conseil International pour l'Exploration de la Mer s'ouvre sans que soit présente cette illustration danoise qu'est M. le Professeur JOHS. SCHMIDT; nous regrettons vivement son absence, mais nous savons que s'il n'est pas avec nous c'est que depuis deux ans il croise à travers les mers du monde. Nous ne sommes pas exactement renseignés sur ce qu'il a fait pendant ces deux années, mais nous sommes certain qu'il a accompli de grandes choses et qu'il rapportera de sa croisière encore plus de gloire, de cette gloire pacifique, la seule à laquelle maintenant les hommes doivent aspirer, pour lui-même, pour sa patrie, pour la science danoise et, je pense bien dire, pour la science mondiale. C'est pourquoi je propose au Conseil International de charger son président d'adresser à notre collègue et ami JOHS. SCHMIDT un message de cordiale et admirative sympathie.

The proposal of M. THÉODORE TISSIER was adopted by acclamation.

Point 2 of the Agenda. Report as to the present participation.

The President reported that, as regards participation there was no change. Fourteen Governments were represented on the Council and Latvia continued to be a free member.

Point 3 of the Agenda. Administrative Report.

As the Administrative Report had only just been circulated the President proposed that an opportunity for comment upon it should be given at the final Council Meeting.

Point 4 of the Agenda. Final Approval of the Accounts for 1928—29.

The President stated that the accounts had been found correct by the Finance Committee. If anyone wanted to examine the accounts, this could be done in the office. These accounts would be submitted for final approval at the final Council Meeting.

Point 5 of the Agenda. Statement of accounts for 1929—30.

The President stated that as the accounts for 1929—30 had only just been circulated, he proposed to defer further consideration of them to the next sitting. Any member would find the details at "Eltham".

Point 6 of the Agenda. Adjustments, if any, of the distributed programme.

The President said that certain changes in the programme had been proposed, but as all chairmen of Committees would meet in the Consultative Committee, the Bureau had asked Dr. HJORT to take up this question at the first sitting of this Committee. He asked them to so arrange the meetings that no meetings should be held on Saturday, as it would otherwise be impossible to have the reports of the Committees finished in time for the final sitting of the Council.

The President further informed the members that the Danish Delegation had expressed the wish that Mr. MORTENSEN should become a member of the Statistical Committee and Dr. JOHANSEN a member of the Northern North Sea Committee, and reminded them of the fact that 2 years ago it had been agreed that any delegate could nominate members of their country to the various Committees with the restriction that in case the Committee had to meet between the Council Meetings the Council would only pay the travelling expenses of one member from each country. Certain other new members of Committees were proposed, among these M. LE GALL and a member from Portugal (to be appointed later) as members of the Plankton Committee, and Mr. MENZIES as a member of the Limnological Committee.

All the other points of the Agenda were postponed to next sitting.

The meeting adjourned.

Second Sitting: Monday, June 2nd, at noon.

The President, Mr. MAURICE, in the chair.
Present: The members and experts (vide list pp. 4—7).

The President opened the meeting and stated that in accordance with the decision of the first sitting of the Council the following telegram had been sent to his Majesty the King of Denmark:—

"A sa Majesté le Roi de Danemark,
Les membres du Conseil International pour l'Exploration de la Mer réunis à Copenhague demandent la permission de témoigner à Votre Majesté leurs sentiments les plus respectueux.
MAURICE, Président,
Merexploration, Copenhague."

in reply to which the following telegram had been received from the king:—

"Mes remerciements sincères et meilleurs voeux pour votre réunion.

CHRISTIAN R."

and that the following telegram had been sent to Prof. SCHMIDT:—

"Le Conseil vous remercie de votre télégramme et sur proposition de M. THÉODORE TISSIER me charge de vous transmettre avec ses regrets pour votre absence forcée un message de cordiale et admirative sympathie.

MAURICE."

He also read a letter from Professor MAGRINI explaining why it was impossible for him to be present and expressing his regret and kind greetings to the Council.

Point 3 of the Agenda. Administrative Report.

No observations having been received on the Report it was adopted without amendment.

Point 4 of the Agenda. Final approval of the Accounts for 1928—29.

The accounts were finally approved.

Point 5 of the Agenda. Statement of Accounts for 1929—30.

The statement of accounts was approved. In connection with the statement of accounts the President informed the Council that he had authorised the payment to Dr. TESCH of 1400 Kr. expended by him in connection with Saving Gears, and asked for their *ex post facto* approval of the expenditure. The approval was accorded.

Point 7 of the Agenda. Consideration of the Reports and Programmes of the Committees.

Editorial Committee. This report was adopted, but with reference to the question of the publication of a report by Messrs. HESSLE and VALLIN on the Plankton in the Baltic Sea it was agreed that the President should be given authority to make an arrangement with Dr. ANDERSSON regarding a contribution from the Council towards the cost of publication, if it should prove impossible to arrange that the whole cost of publication should be borne by the Swedish Government.

Consultative Committee. The report of the Consultative Comittee was adopted including the following recommendations involving expenditure:—

1) The proposal (see Appendix 2 to the report of the Consultative Committee, p. 30) to hold a meeting in England to consider the commercial prospects of the transplantation of plaice.
2) The publication in the Area report of the North Western Area Committee of certain papers (see the Recommendation of the North Western Area Committee p. 38, and p. 76, II, 1).
3) A meeting of experts at Lisbon for the purpose of deciding upon uniform methods for the ichthyometrical study of the races of pilchards (see Report of the Committee of the Atlantic Slope p. 42, 7b).
4) The proposals of the Southern North Sea Committee endorsed by the Combined North Sea Committee to hold a meeting of experts in Lowestoft to consider the standard-

isation of the methods to be employed in Herring investigations (see pp. 44, II, 1, and 50, 2, 1).

5) The printing in the Rapports & Procès-Verbaux of the Report of the Transition Area Committee concerning Plaice investigations in the Cattegat and Skagerak (see p. 52, II, 2 and 76, II, 1).

6) The following proposals of the Hydrographical Committee:—

a) Meeting of experts on Salinity Normals if the necessity should arise (see p. 60, par. 3 and p. 64, par. 2). This matter was left for settlement between the President and Professor KNUDSEN.

b) The elaboration of charts of isotherms for the North Sea (see p. 60, par. 4 and p. 64, par. 3).

c) A meeting of the Sub-committee on the study of sub-marine waves in the Cattegat and the Belt Sea, if necessary, was left for settlement between the President and Professor KNUDSEN (see p. 64, par. 4).

d) A meeting of experts at Helsingfors (see p. 64, par. 5 and Appendix).

e) The invitation of Profs. V. W. EKMAN, G. I. TAYLOR and Dr. H. THORADE to attend next year's Scientific Hydrographic Meeting (see p. 64, par. 6).

f) The publication of tables prepared by Mr. D. J. MATTHEWS for the calculation of densities (se p. 66, par. 7).

7) The following recommendations of the Plankton Committee:—

a) A revote of the residue of the sum voted last year for the study of the catching power of the various types of Plankton nets (see p. 68, I, 1).

b) A revote of the sum voted last year for the printing of Professor OSTENFELD's Summary of the Résumé Planktonique (see p. 68, II, 3 and 76, II, 1).

Further on consideration of the report of the Committee the Bureau wished to propose:—

c) the payment of an honorarium of 1000 Kr. to Prof. OSTENFELD for his work on the above, and

d) the payment of a yearly salary of 1000 Kr. to the chairman of the Plankton Committee.

8) The publication of Part No. II of Prof. HENKING's Report on Salmon and Sea Trout (see p. 72, II, 1).

The payment to Prof. HENKING of a second honorarium for work on Salmon and Sea Trout was agreed in principle, but consideration of the amount of the honorarium was deferred to be dealt with in connection with next Budget.

The Council having approved the financial recommendations as set out above adopted all the reports of the Committees en bloc in the form in which they are printed herewith.

The President drew attention to the fact that all the chairmen had been reelected by their respective Committees.

Point 8 of the Agenda. Estimates for the financiel year 1930—31.

A revised Estimate was laid before the Council. The President explained in details

the amendments of the provisional Estimates submitted to the Council at its first sitting directing attention in particular to the following points:—

Item IV. Travelling Expenses had been raised from 13000 to 14500 Kr. to meet the cost of the various meetings of Expert Committees approved by the Council.

At the same time he announced that the Bureau had decided that the normal daily subsistence allowance would for the future be 30 Kr. instead of 35 Kr. which was the allowance fixed by the Bureau at the meeting in Paris in October 1929.

Item VIII (a). 6500 Kr. for a meeting in Helsingfors.

Item VIII (b). The Bureau thought it advisable to charge the cost of Professor JOUBIN's Fiches Faunistiques to the reserve fund regarding it as a special publication for the use of biological workers rather than as a report of Scientific investigations. They had provided some 9000 Kr. for this purpose in the budget in order that adequate funds should be available for as many sets of the Fiches Faunistiques as Prof. JOUBIN could produce in the immediate future.

Mr. MATTHEW's density tables were also regarded by the Bureau as a special publication for the use of hydrographical workers rather than as a report of Scientific investigations, and it had been decided to charge the cost of them also against the reserve fund.

The Bureau had also thought it desirable that Prof. JOUBIN's work in connection with the preparation of the Fiches Faunistiques should be recognised by an honorarium and they proposed that the Council should accord him 1000 Kr. for his work in connection with the first four sets leaving the question of any further sum to be discussed at a later meeting.

With these explanations the President invited the Council to accept the revised Estimates. The Council agreed.

The President pointed out that not only was the reserve fund being diminished by a considerable sum, but that unless, as he hoped, some saving would be effective on the budget for Travelling expenses and Publications, the expenditure under the part of the budget chargeable to revenue would in fact exceed the revenue. He hoped that this budget would be regarded as acceptable, and that next year it would be possible to make savings which would redress the balance.

Point 9 of the Agenda. Nomination of the members of the Bureau, and the Finance Committee, and the Editorial Committee, and of the Editors etc.

The following were nominated members of the Finance Committee:— The President, *ex officio*, Prof. KNUDSEN and Prof. SCHMIDT as permanent members and Professors ODÓN DE BUEN, GILSON and WITTING.

The Editorial Committee with Professor PETTERSSON as chairman was re-elected.

Professor D'ARCY THOMPSON was re-elected as Editor for the Bulletin Statistique.

Dr. E. S. RUSSELL was re-elected as Editor for the Journal du Conseil and at his request Mr. J. R. LUMBY was elected Assistant Editor, each of them receiving 2000 Kr. for their services.

Prof. M. KNUDSEN was re-elected Hydrographical Consultant.

The Administrative Secretary read the following letter from the Spanish Delegation, the members of which had been obliged to leave before the meeting:—

"La Délégation espagnole a l'honneur de proposer au Conseil permanent International pour l'Exploration de la Mer la réélection du Bureau."

The proposal of the Spanish Delegation was seconded by Prof. KNUDSEN and the Bureau was re-elected as a whole.

The President thanked the Council for the renewal of their confidence.

Point 10 of the Agenda. Time and place for the next Council Meeting.

The President announced that the time and place of the next Meeting would be discussed by the Bureau at their autumn meeting. He asked that any members of the Council who had suggestions to offer on this subject should forward them to the Administrative Secretary as early as possible in order that they might be fully considered.

Point 11 of the Agenda. Other business.

The President drew attention to the importance of sending in as early as possible manuscripts of reports approved for publication. He said it was the wish of the Bureau that the Manuscripts of all Reports the publication of which had been voted at this meeting should reach the office not later than March 1st next, in order that the report might be issued before the next meeting of the Council. It was intended that this rule should be generally applied so that whatever reports the Council made provision for at one meeting should be complete and available in time for the next.

Point 12 of the Agenda. Conclusion of Meeting.

On the motion of the President the following votes of thanks were accorded by acclamation:—

To the Chairman of the Consultative Committee,
to the organisers of the Scientific Meetings,
to the Administrative Secretary,
to the Secretarial Staff of the Office, and
to the Danish Government for the arrangements made for the comfort of the Council and for their hospitality. Prof. KNUDSEN was requested by the Council to convey their acknowledgements to the Government.

In conclusion the President referred to the numerous expressions of satisfaction with the work of the present meeting which he had heard, and expressed the hope that even better meetings might be held in future, and that the reputation of the Council for serious scientific work with a clear view to the application of its results to practical affairs might be maintained and enhanced.

On the motion of Professor KNUDSEN a vote of thanks was passed to the President for his services, which the President briefly acknowledged.

ESTIMATES

of

the International Council for the Study of the Sea for the financial year 1930—31.

Receipts:—

Head	No.	Item	Kroner	Kroner
I	1	**BALANCE** on the 31st March 1930 constituting the reserve of the Council		191,046,36 [1]
		ORDINARY RECEIPTS:—		
II	2	**Annual Contributions of the Governments**	172,000,00	
III	3	**Interests on bank deposit** ..... estimated	4,000,00	
IV	4	**Interests on Treasury Bonds**	3,500,00	
V	5	**Sale of publications** ..... estimated	2,500,00	182,000,00
		Total Receipts ... estimated		373,046,36

[1]) **Balance:—**
Kr. 68,118,05 Danish Treasury Bonds.
„ 122,928,31 Cash and deposited in the Handelsbank.
Kr. 191,046,36

Expenditure:—

Head	No.	Item	Kroner	Kroner
I		**ORDINARY EXPENDITURE:—**		
		Incidental expenses:—		
	1	President	6,000,00	
	2	Chairman of the Editorial Committee	2,000,00	
	3	Hydrographic Consultant	3,000,00	
	4	Editor for Statistics	2,000,00	
	5	Editor of the Journal	2,000,00	
	6	Assistant Editor of the Journal	2,000,00	
			17,000,00	17,000,00
II		**Administrative Staff:—**		
	7	Administrative Secretary	13,200,00	
	8	1st Assistant Secretary	6,000,00	
	9	2nd Assistant Secretary	4,500,00	
	10	Hydrographic Staff	13,000,00	
	11	Statistical Assistant	4,000,00	
			40,700,00	40,700,00
III		**Expenses of the office in Copenhagen:—**		
	12	Rent, service, heating, stationery, books, binding of books, light, gas, telephone, telegrams, insurance, postage, freight, typewriting and miscellaneous expenses	15,000,00	15,000,00
IV	13	**Travelling expenses**	14,500,00	14,500,00
V	14	**Chairmen of Committees**	30,000,00	30,000,00
VI	15	**Printing and distribution**	53,000,00	53,000,00
VII	16	**Transferred to Pension Fund**	3,500,00	3,500,00
		to carry forward ...		173,700,00

Head	No.	Item	Kroner	Kroner
		Brought forward...		173,700,00
VIII.		**EXTRAORDINARY EXPENDITURE:—**		
	17	**Special Resolutions:—**		
		(a) Chargeable to revenue.		
		Carbonic Acid researches in Helsingfors	6,500,00	
		Experiments with Plankton nets	800,00	
		Ostenfeld's Plankton Résumé	1,000,00	
		Supplementary expenditure for Binding of books	800,00	9,100,00
		(b) Chargeable to reserve.		
		Mrs. Drechsel's pension	6,500,00	
		Liverpool Tidal Institute (£ 150)	2,730,00	
		Cost of production of Prof. Joubin's Fiches Faunistiques	9,000,00	
		Honorarium to Prof. Joubin for the first four sets of Fiches Faunistiques	1,000,00	
		Mr. Matthew's Salinity Tables	1,500,00	20,730,00
		Total Expenditure...		203,530,00

Annual Contributions of the Governments:—

Belgium	5,000,00
Great Britain	20.000,00
Denmark	10,000,00
Finland	5,000,00
France	20,000,00
Germany	20,000,00
Irish Free State	5,000,00
Italy	20,000,00
Netherlands	10,000,00
Norway	10,000,00
Poland	10,000,00
Portugal	5,000,00
Spain	20,000,00
Sweden	10,000,00
Latvia	2,000,00
Kr....	172,000,00

Special Reserve for Pensions.

Treasury Bonds and Bank Deposit at 31st March 1930		Kr. 15,269,86
Interests from Treasury Bonds falling due in 1930—31		- 3,500,00
Interests from the Special Reserve itself	estimated	- 860,00
		Kr. 19,629,86

ESTIMATES *)

of

Publications to be printed during the financial year 1930—31.

Series	Subject	Authorisation	Estimated cost Kroner	Remarks
Rapp. & Proc.-Verb.	Procès-Verbaux 1930	Standing order	3,200.00	
—	Rapport Atlantique	— —	2,000.00	
—	Reports of the Scientific Meetings	— —	6,000.00	
—	Salmon and Sea Trout	Proc.-Verb. current issue p. 14	3,000.00	
—	Transition Area Report	Proc.-Verb. current issue p. 14	2,600.00	
—	North Western Area Report	Proc.-Verb. current issue p. 13	3,200.00	
Bulletin	Hydrographique	Standing order	5,000.00	
—	Offprints of Bull. Hydr. for monthly distribution	Proc.-Verb. Vol. LX p. 12	1,500.00	
—	Résumé Planktonique	Proc.-Verb. current issue p. 14	2,000.00	Revote from last year
—	Statistique	Standing order	1,800.00	
Journal du Conseil	Vol. V, Nos. 2 & 3 Vol. VI, No. 1	— —	9,000.00	
Other publications at the discretion of the President...			6,000.00	
		Total...	Kr. 45,300.00	

Other costs of publication:	
Translations, drawings etc.	Kr. 3,500.00
Distribution.....	- 4,200.00
	Kr. 53,000.00

*) NB. These Estimates are framed as closely as the conditions permit, but are inevitably subject to considerable variation according to the ultimate cost of production.

List of Members of Committees.

Consultative Committee.

Professor Johan Hjort, Chairman,
Mr. Oscar Sund,
Professor Johs. Schmidt,
Dr. Ed. le Danois,
Professor Rafael de Buen,
Mr. David T. Jones,
Prof. G. Gilson,
Prof. W. Mielck,
Dr. A. Bowman,
Mr. J. O. Borley,
Dr. A. C. Johansen,
Dr. K. A. Andersson,
Professor Martin Knudsen,
Professor C. H. Ostenfeld,
Professor D'Arcy W. Thompson,
Professor H. Henking,
Dr. E. S. Russell.

North Eastern Area Committee.

Norway:	Professor Johan Hjort, Chairman,
	Mr. Oscar Sund, Vice-chairman,
	Mr. S. K. Asserson,
Denmark:	Professor Johs. Schmidt,
England:	Dr. E. S. Russell,
France:	Commandant Charcot,
	failing him Dr. Ed. le Danois,
Germany:	Dr. H. Lübbert,
Scotland:	Dr. R. S. Clark,
Sweden:	Dr. K. A. Andersson,

North Western Area Committee.

Denmark:	Professor Johs. Schmidt, Chairman,
England:	Dr. E. S. Russell,
France:	Dr. Ed. le Danois,
Germany:	Professor E. Ehrenbaum,
Norway:	Mr. Oscar Sund,
Scotland:	Dr. A. Bowman.

Atlantic Slope Committee.

France:	Dr. Ed. le Danois, Chairman,
	Professor L. Joubin,
	Professor L. Roule,
Spain:	Professor Rafael de Buen, Vice-chairman,
	Professor José Giral,
England:	Dr. E. J. Allen,
	Dr. E. S. Russell,
Germany:	Professor G. Schott,
Irish Free State:	Mr. G. P. Farran,
Italy:	Professor G. Magrini,
Portugal:	Dr. A. Ramalho.

Combined North Sea Committee.

Mr. David T. Jones, Chairman,
Professor G. Gilson, Vice-chairman.

Northern North Sea Committee.

Scotland:	Dr. A. Bowman, Chairman,
Denmark:	Professor Johs. Schmidt,
	Dr. A. C. Johansen,
England:	Mr. F. M. Davis,
France:	Mr. J. le Gall,
Germany:	Professor E. Ehrenbaum,
Holland:	Dr. J. J. Tesch,
Norway:	Mr. Oscar Sund,
Poland:	Mr. J. Borowik,
Sweden:	Professor O. Pettersson,
	Dr. A. R. Molander.

Southern North Sea Committee.

Germany:	Professor W. Mielck, Chairman,
Belgium:	Professor G. Gilson,
Denmark:	Dr. A. C. Johansen,
England:	Mr. F. M. Davis,
France:	Mr. J. le Gall,
Holland:	Mr. P. M. van Riel,
	Dr. J. J. Tesch,
Norway:	Mr. Paul Bjerkan,
Scotland:	Dr. A. Bowman,
Sweden:	Dr. K. A. Andersson.

Transition Area Committee.

Denmark:	Dr. A. C. Johansen, Chairman,
	Professor Martin Knudsen,
Germany:	Dr. S. Strodtmann,
	Dr. E. Fischer,
Norway:	Mr. Paul. Bjerkan,
Sweden:	Professor O. Pettersson,
	Dr. K. A. Andersson.

Baltic Area Committee.

Sweden:	Dr. K. A. Andersson, Chairman,
Denmark:	Dr. A. C. Johansen,
	Professor Martin Knudsen,
Finland:	Professor R. Witting,
	Professor T. H. Järvi,
Germany:	Professor H. Henking,
	Dr. E. Fischer,
Latvia:	Mr. V. Miezis,
Poland:	Professor M. Siedlecki,
	Mr. J. Borowik.

Hydrographic Committee.

Denmark:	Professor Martin Knudsen, Chairman,
Belgium:	Professor G. Gilson,
England:	Dr. J. N. Carruthers,
	Mr. J. R. Lumby,
Finland:	Professor R. Witting,
France:	Dr. Ed. le Danois,
	Mr. J. le Gall,

Germany:	Professor G. Schott,
Holland:	Mr. P. M. van Riel,
	Professor E. van Everdingen,
Irish Free State:	Mr. G. P. Farran,
Italy:	Professor G. Magrini,
Latvia:	Mr. V. Miezis,
Norway:	Mr. Oscar Sund,
Poland:	Professor M. Siedlecki,
Portugal:	Dr. A. Ramalho,
Scotland:	Professor D'Arcy W. Thompson,
Spain:	Mr. Léon Herrero,
	Professor José Giral,
	failing them Professor Rafael de Buen,
Sweden:	Professor O. Pettersson.

Plankton Committee.

Denmark:	Professor C. H. Ostenfeld, Chairman,
Belgium:	Professor G. Gilson,
England:	Mr. R. E. Savage,
France:	Mr. J. le Gall,
Germany:	Professor K. Brandt,
Holland:	Dr. J. J. Tesch,
Irish Free State:	Mr. G. P. Farran,
Latvia:	Mr. V. Miezis,
Norway:	Mr. Paul Bjerkan,
	Professor H. H. Gran,
Poland:	Dr. A. Litynski,
Portugal:	.....
Scotland:	Dr. R. S. Clark,
Spain:	Dr. Juan Cuesta Urcelay,
Sweden:	Dr. K. A. Andersson.

Statistical Committee.

Scotland:	Professor D'Arcy W. Thompson, Chairman,
	Mr. David T. Jones,
Belgium:	Professor G. Gilson,
Denmark:	Mr. F. V. Mortensen,
England:	Dr. E. S. Russell,
	Mr. T. Edser,
Finland:	Professor T. H. Järvi,
France:	Mr. G. Lecourbe,
Germany:	Dr. E. Fischer,

Holland:	Dr. J. J. Tesch,
Irish Free State:	Mr. C. Green,
Latvia:	Mr. V. Miezis,
Norway:	Mr. S. K. Asserson,
Poland:	Mr. J. Borowik,
Spain:	Mr. le Com. José Maria Roldán,
	Dr. Fernando de Buen,
Sweden:	Dr. K. A. Andersson.

Limnological Committee.

Germany:	Professor H. Henking, chairman,
	Professor E. Ehrenbaum.
Denmark:	Dr. A. C. Johansen,
England:	Dr. E. S. Russell,
Finland:	Professor T. H. Järvi,
France:	Professor L. Roule,
Irish Free State:	Mr. R. Southern,
Latvia:	Mr. V. Miezis,
Poland:	Professor M. Siedlecki,
	Dr. F. E. Lubecki,
Scotland:	Mr. W. J. M. Menzies,
Spain:	Dr. Fernando de Buen,
	Mr. Manuel Aulló,
Sweden:	Dr. K. A. Andersson.

Editorial Committee.

Professor O. Pettersson, chairman,
Professor D'Arcy W. Thompson,
Professor G. Gilson,
Professor L. Joubin,
failing him Dr. Ed. le Danois,
Professor Martin Knudsen,
Professor E. Ehrenbaum,
Professor Odón de Buen,
Professor G. Magrini,
Professor M. Siedlecki,
Dr. E. S. Russell.

Finance Committee.

The President,
Professor M. Knudsen,

Professor Johs. Schmidt,
Professor Odón de Buen,
Professor G. Gilson,
Professor R. Witting.

Special Committees.

Whaling Committee.

Professor Johan Hjort, Chairman,
Mr. J. O. Borley,
Dr. Fernando de Buen,
Dr. Ed. le Danois,
Mr. David T. Jones,
Deputy Dr. A. Bowman,
Professor Johs. Schmidt,
Dr. A. Ramalho,
Dr. H. Lübbert.

Sub-Committee on North Sea Problems.

Dr. K. A. Andersson,
Dr. A. Bowman,
Dr. Ed. le Danois,
Professor G. Gilson,
Dr. A. C. Johansen,
Professor W. Mielck,
Dr. E. S. Russell,
Dr. J. J. Tesch.

Sub-Committee on Transplantation of Plaice.

Dr. A. C. Johansen,
Professor W. Mielck,
Dr. E. S. Russell,
Dr. J. J. Tesch.

Recommendations of the Consultative Commitee.

Chairman: Prof. Johan Hjort.

The Committee met on May 26th and 31st, 1930, at 2.30 and 3 p. m. respectively.

1. North Sea Problems.

The Experts requested in 1929 (see Rapp. & Proc.-Verb., Vol. LX, page 15, point d) to consider certain questions as to the application of results to the benefit of the industry were accepted as a Sub-committee of the Consultative Committee.

The recommendations of this Sub-committee, which are appended (see Appendix Nr. 1), were accepted as recommendations of the Consultative Committee.

A Sub-committee was appointed to consider the commercial prospects of a transplantation of plaice.

The recommendations of this Sub-committee, which are appended (see Appendix Nr. 2), were accepted as Recommendations of the Consultative Committee, and it was agreed to ask Dr. E. S. Russell to convene the meeting.

2. Scientific Meetings.

The Committee decided that the same procedure should be followed for the arrangements of next year's Scientific Meetings and for the printing of the papers given at the Scientific Meetings held on May 26th.

Dr. A. Bowman was asked to make all arrangements for the Biological Meeting next session and to act as Chairman, Prof. M. Knudsen being requested to act similarly for the Hydrographic Meeting.

The following subjects were selected for discussion at the Scientific Meetings of 1931:—

Biological:— The effect on the stock of the capture of undersized fish.
The relation of p_H and CO_2 to the amount of plankton.

Hydrographic:— The mixing question, viewed theoretically and practically, together with a consideration of internal waves.

3. Information regarding soundings.

A letter received from Rear-Admiral H. P. Douglas, C. B., C.M.G., R.N., which is appended (see Appendix Nr. 3), was circulated for the relevant action of the members.

4. Conference at Lowestoft.

In reference to the Recommendation of the Combined North Sea Committee in favour of a conference at Lowestoft on the standardisation of methods and further cooperation it was agreed to request Dr. E. S. Russell to convene the meeting.

Recommandations du Comité Consultatif.

Président: Le Prof. Johan Hjort.
Le Comité se réunit le 26 et le 31 Mai 1930 à 2h30 et à 3h p. m. respectivement.

1. Problèmes de la Mer du Nord.

Les Experts chargés, en 1929 (voir Rapp. et Proc.-Verb. Vol. LX, p. 15 point d) d'examiner certaines questions relatives à l'application des résultats à l'avantage de l'industrie, ont été admis à constituer un Sous-Comité du Comité Consultatif.

Les recommandations de ce Sous-Comité ci-annexées (voir Appendice no. 1) ont été acceptées comme recommandations du Comité Consultatif.

Un Sous-Comité est nommé pour examiner la transplantation de la plie sous son aspect commercial.

Les recommandations de ce Sous-Comité, ci-annexées (voir Appendice no. 2) sont acceptées comme recommandations du Comité Consultatif, et on est d'accord pour demander au Dr. E. S. Russell d'en convoquer la réunion.

2. Réunions Scientifiques.

Le Comité décide que la même procédure devra être suivie pour les arrangements des Réunions Scientifiques de l'année prochaine et pour l'impression des travaux présentés à la réunion scientifique qui s'est tenue le 26 Mai.

Le Dr. Bowman est prié de prendre toutes les dispositions pour la Réunion Biologique de la session suivante et d'agir en qualité de Président. Le Prof. M. Knudsen est prié d'agir de même pour la Réunion Hydrographique.

Les sujets suivants sont choisis pour la discussion aux Réunions Scientifiques de 1931:

Biologie:— L'effet de la capture des poissons de taille inférieure, sur le stock.
La relation entre le p_H et le CO_2 et la quantité du plancton.

Hydrographie:— La question du mélange examinée théoriquement et pratiquement, ainsi que dans ses rapports avec l'existence de vagues internes.

3. Information concernant les Sondages.

Une lettre reçue du Contre-Amiral H. P. Douglas, C.B., C.M.G., R.N. ci-annexée (voir Appendice no. 3) est communiquée aux membres en vue de leur action respective.

4. Conférence à Lowestoft.

Au sujet de la Recommandation du Comité Combiné de la Mer du Nord en faveur d'une conférence à réunir à Lowestoft pour la standardisation des méthodes et pour la coopération dans l'avenir, on est d'accord pour demander au Dr. E. S. Russell, d'en convoquer la réunion.

5. Reports of Committees.

The following reports of Committees were presented by the Chairmen of the Committees concerned and were passed by the Consultative Committee:—

North Eastern Area Committee.
Atlantic Slope Committee.
Northern North Sea Committee.
Transition Area Committee.
Combined Baltic and Transition Area Committees.
Hydrographic Committee.
Statistical Committee.
Whaling Committee.
North Western Area Committee.
Combined North Sea Committee.
Southern North Sea Committee.
Baltic Committee.
Plankton Committee.
Limnological Committee.
Scientific Meetings.

The Consultative Committee agreed the following proposals which involve expenditure:—

Sub-committee on Transplantation of Plaice.
North Western Area, II, 1.
Atlantic Slope Committee, II, 7, b.
Combined North Sea Committee, II, 1.
Transition Area Committee, II, 2.
Hydrographic Committee, II, 3, 5 and 7.
Plankton Committee, II, 2 and 3.
Limnological Committee, II, 1.

Appendix Nr. 1.

Sub-Committee on North Sea Problems.

I. That this Committee should be continued for the present as a Sub-committee of the Consultative Committee.

II. That the preparation of detailed fishery charts, showing e. g. depth contours and the nature of the bottom, should be further considered by this Sub-committee.

With regard to inserting on such fishery charts useful indications of characteristic bottom fauna, each member of this Sub-committee should consider what data are available in his country for this purpose, and should draw up a report including if possible specimen charts for submission to this Sub-committee next year.

III. That the Council should impress on the Governments concerned the importance of carrying out further and more detailed bathymetric surveys of the fishing areas of the North Atlantic, in view of the rapid expansion of the fishing industry and the recent improvements in the methods of sounding.

5. Rapports des Comités.

Les rapports suivants, des Comités, ont été présentés par les Présidents respectifs et agréés par le Comité Consultatif:

Comité du Secteur Nord-Est,
Comité du Plateau Continental Atlantique,
Comité du Nord de la Mer du Nord,
Comité du Secteur de Transition,
Comités combinés de la Baltique et du Secteur de Transition,
Comité Hydrographique,
Comité Statistique,
Comité de la Baleine,
Comité du Secteur Nord-Ouest,
Comité combiné de la Mer du Nord,
Comité du Sud de la Mer du Nord,
Comité Baltique,
Comité du Plancton,
Comité Limnologique,
Réunions scientifiques.

Le Comité Consultatif agrée les propositions des Comités suivants qui comportent des dépenses:

Sous-Comité pour la Transplantation de la Plie,
Comité du Secteur Nord-Ouest II, 1.
Comité du Plateau Continental Atlantique II, 7, b,
Comité Combiné de la Mer du Nord II, 1.
Comité du Secteur de Transition II, 2,
Comité Hydrographique II, 3, 5 et 7,
Comité du Plancton II, 2, 3,
Comité Limnologique II, 1.

Appendice No. 1.

Sous-Comité des Problèmes de la Mer du Nord.

Il est recommandé:

I. Que ce Comité soit continué pour le moment, comme Sous-Comité du Comité Consultatif.

II. Que la préparation de cartes de pêcherie détaillées indiquant, entre autres choses, des contours isobathes et la nature du fond, soit envisagée par ce Sous-Comité.

Au sujet de l'insertion sur les cartes de pêcherie de ce genre, d'indications utiles sur la faune caractéristique du fond, que chaque membre de ce Sous-Comité examine quelles sont les données que l'on peut obtenir dans son Pays et fasse un rapport comprenant, si possible, des cartes spécimens à soumettre à ce Sous-Comité l'année prochaine.

III. Que le Conseil agisse sur les Gouvernements intéressés au sujet de l'importance de l'exécution d'explorations bathymétriques nouvelles et plus détaillées des aires de pêche de l'Atlantique Nord, en vue de favoriser l'expansion rapide de l'industrie de la pêche et en considération des progrès récents des méthodes de sondage.

IV. The members having unanimously expressed willingness to supply all material in their power, the Sub-committee recommends, that the Council should request the British Government to organize under the control of the Fishery Board for Scotland a service of collecting information as to the abundance and distribution of the 0-Group of haddock, with a view to making predictions as to the probable effects on the future marketable stock, on the understanding that a report should be laid before this Sub-committee yearly.

V. That the Southern North Sea Committee be asked to discuss whether any arrangements should now be made to organize a central service of prediction in connection with other fish, e. g. the herring and the plaice.

VI. The Sub-committee accepts the conclusions drawn from the scientific investigations carried out in Great Britain and Sweden on the effect of larger codend meshes in the catch of haddock and considers that they should be repeated in other countries.

It considers that the question of saving round fish just under marketable size by means of enlarged codend meshes is so far advanced that it might profitably be discussed with the fishing industry in each country. In these discussions the desirability of large-scale experiments to be carried out by the industry and controlled by trained observers should be impressed upon the industry.

It expresses the hope that the results of these discussions will be reported to this Sub-committee next year, when the question will be further considered.

VII. That the North Sea Committees be asked to organize research on the effect upon other fish, e. g. plaice, sole and herring, of the enlarged codend meshes used in the haddock investigations.

Appendix Nr. 2.

Sub-Committee on Transplantation of Plaice.

Dr. JOHANSEN gave an account of the Danish operations in transplanting small plaice from the North Sea littoral to the Belts and adjacent waters, and produced evidence that these operations were a success commercially. The Sub-committee agreed that there was a *prima facie* case for a detailed enquiry into the costs and probable success of a large-scale transplantation from the Danish inshore waters to the Dogger Bank. They beg to suggest that a further meeting should be held in London[1]) at the end of October for this purpose, at which the attendance of a representative of the British fishing industry would be welcomed. In the meantime the question will be studied by the members of the Sub-committee and all relevant information interchanged.

[1]) It was subsequently agreed that this Meeting should take place at Lowestoft just before or after the meeting regarding herring investigations (see p. 44, II, 1).

IV. Les membres ayant exprimé unanimement leur bonne intention de fournir tous les matériaux dont ils pourront disposer, le Sous-Comité recommande: que le Conseil prie le Gouvernement Britannique d'organiser, sous le contrôle du Fishery Board for Scotland, un service d'information sur l'abondance et la distribution du groupe 0 de l'aiglefin, en vue de la prévision des effets probables de cette abondance et de cette distribution sur le stock commercial futur. Il est entendu qu'un rapport annuel devra être présenté au Sous-Comité.

V. Que l'on demande au Comité du Sud de la Mer du Nord de discuter la question de savoir si des arrangements pourraient être pris dès à présent en vue d'organiser un service central de prévision au sujet d'autres poissons, tels que le hareng et la plie.

VI. Le Sous-Comité acceptant les conclusions des investigations scientifiques conduites en Grande Bretagne et en Suède, au sujet de l'effet d'un élargissement des mailles de l'arrière-fond du chalut sur la capture de l'aiglefin, estime que ces investigations devraient être répétées dans d'autres Pays.

Il estime que la question de l'épargne des poissons ronds, voisins de la taille marchande, par les arrière-fonds à mailles élargies, est assez avancée pour qu'on puisse la discuter avec l'industrie de la pêche dans tous les Pays. Dans ces discussions on devrait insister sur l'avantage d'expériences conduites sur une large échelle par l'industrie elle-même et contrôlées par des observateurs entraînés.

Il exprime l'espoir de voir les résultats de ces discussions rapportés à ce Sous-Comité l'an prochain quand la question sera reprise en considération.

VII. Que les Comités de la Mer du Nord soient priés d'organiser des recherches au sujet de l'effet produit sur les autres poissons — plie, sole et hareng — par les arrière-fonds à mailles élargies employés dans les investigations sur l'aiglefin.

Appendice No. 2.

Sous-Comité de la Transplantation de la Plie.

Le Dr. Johansen fait rapport sur les opérations Danoises en fait de transplantation des petites plies du littoral de la Mer du Nord, dans la Mer des Belts et dans les eaux adjacentes, et produit des preuves du succès commercial de ces opérations. Le Sous-Comité admet qu'il y a lieu de faire une enquête détaillée préalable sur le coût et sur les chances de succès d'une transplantation, faite sur une large échelle, des eaux littorales Danoises au Dogger Bank. Il désire suggérer la tenue ultérieure à Londres[1]), vers la fin d'Octobre, d'une réunion à laquelle un représentant de l'industrie de la pêche Britannique serait le bienvenu. Entre-temps la question sera étudiée par les membres du Sous-Comité et donnera lieu à des échanges d'information.

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[1]) Ultérieurement, il est convenu que cette réunion se tienne à Lowestoft immédiatement avant ou après la réunion concernant les investigations sur le hareng (voir p. 45, II, 1).

Appendix Nr. 3.

To the

Chairman of the Consultative Committee,

Sir,

I should be very grateful if any positive soundings whose positions are accurately known may be supplied direct to me at the Admiralty, London, for the correction of the British Admiralty charts. Information required is ship, date and time; Lat.; Long.; how obtained; Depth, quality of the bottom, how depth was obtained (e.g. Wire, Echo &c.). This information is also required for a bathymetric chart of the oceans which is being prepared.

May, 29th 1930.

(Sgd.) H. P. Douglas,
Rear-Admiral & Hydrographer of the Navy.

Appendice No. 3.

Au

Président du Comité Consultatif.

Monsieur,

Je m'estimerais très obligé si tout sondage positif dont la position serait exactement connue, pouvait m'être communiqué directement à l'Amirauté, à Londres, pour la correction des cartes de l'Amirauté Britannique. Les informations requises sont: le navire, le temps et la date; la latitude et la longitude; la méthode d'obtention de celles-ci; la profondeur, la nature du fond, la méthode qui a fourni la profondeur, (cable, écho, etc.). Ces informations sont aussi demandées pour la préparation d'une carte bathymétrique des Océans.

29 Mai 1930.

(s.) H. P. Douglas,
Contre-Amiral et Hydrographe de la Marine.

Programmes and Reports of Area Committees.

North Eastern Area Committee.

Chairman: Prof. Johan Hjort.
Vice-Chairman: Mr. Oscar Sund.
The Committee met on May 28th, 1930 at 2.30 p. m.

I. Proceedings.

1) The Vice-Chairman resumed the principal points of the Administrative Report for 1929.

The biological statistical work has been enlarged by the very welcome cooperation afforded by Germany, the Heligoland Institution having organised measurements of Barents Sea catches in Wesermünde.

Prof. Mielck expressed his gratification that the German contribution had met with the appreciation accorded by Mr. Sund. He hoped to provide even more material next year, especially also from smaller fish thrown over board by the commercial trawlers. Dr. Lundbeck would undertake two voyages in a trawler to the Barents Sea next year.

The Chairman expressed his hope for extended cooperation with the other countries in order to enable the Barents Sea cod and haddock population to be studied as accurately as was now possible in the case of the North Sea haddock.

Cooperation was promised from English and French side by Dr. Russell and Dr. le Danois, respectively.

2) On a request from the Chair Admiral Douglas outlined briefly the construction and staffing of the English surveying ship that is now under construction and will be ready for work about June 1931.

This vessel will be an oil fired steamship of some 2,100 tons displacement, will have an endurance of about 10,000 miles, and will be capable of keeping the sea for two months. She will be built and staffed by the British Admiralty. Her principal task will be the determination of the contour of the sea-bed, and accordingly of the position and extent of fishing grounds. For this purpose she will be equipped with steam driven Lucas sounding machines and with both deep and shallow echo sounding gear of British Admiralty type. In addition to the work of sounding she will carry out fishery work, a trawling skipper being carried for testing fishing grounds with the trawl, and oceanographical work bearing on fisheries, and will be adequately equipped for all those operations.

She will carry 6 Surveyors, so that the work of sounding may be carried out continuously, one hydrologist and one biologist: while accommodation can be provided for other scientific men who may from time to time wish to make a cruise in the ship.

Programmes et Rapports des Comités des Secteurs.

Comité du Secteur Nord-Est.

Président: Le Prof. Johan Hjort.
Vice-Président: M. Oscar Sund.
Le Comité se réunit le 28 Mai 1930 à 2h30 p. m.

I. Compte rendu.

1) Le Vice-Président résume les principaux points du Rapport Administratif de 1929.

Le travail statistique biologique s'est accru par la coopération très bienvenue de l'Allemagne, l'Institution de Helgoland ayant organisé à Wesermund des mensurations de captures faites dans la Mer de Barents.

Le Prof. Mielck exprime la satisfaction que lui a causée l'appréciation de M. Sund au sujet de la contribution Allemande. Il espère pouvoir fournir l'année prochaine des matériaux encore plus importants, spécialement au sujet du petit poisson qui est rejeté à la Mer à bord des chalutiers commerciaux. Le Dr. Lundbeck entreprendra deux voyages à bord d'un chalutier dans la Mer de Barents l'année prochaine.

Le Président exprime l'espoir de voir la coopération s'étendre à d'autres pays afin que l'étude de la population du cabillaud et de l'aiglefin de la Mer de Barents puisse être poussée avec autant de précision que celle de l'aiglefin de la Mer du Nord.

La coopération de l'Angleterre et de la France est promise, respectivement par le Dr. Russell et le Dr. le Danois.

2) Sur la demande du Président, l'amiral Douglas esquisse brièvement la structure et le personnel du navire d'inspection Anglais qui est en construction et qui sera prêt pour le travail vers le mois de Juin 1931.

Le navire sera un steamer chauffé à l'huile d'environ 2,100 tonnes de déplacement. Il aura une endurance d'environ 10,000 milles et sera capable de tenir la mer pendant 2 mois. Il sera construit et équipé par l'Amirauté Britannique. Sa tâche principale sera la détermination du contour du lit de la mer et, conséquemment de la position et de l'étendue des champs de pêche. Dans ce but, il sera pourvu d'une machine à sonder de Lucas, à vapeur, et, en même temps, de l'appareil à sondage par l'écho pour les grandes et les petites profondeurs, du type de l'amirauté Britannique. En outre de ce travail de sondage le navire exécutera du travail de pêcherie, un patron chalutier étant embarqué pour l'étude des champs de pêche à l'aide du chalut, ainsi que du travail hydrographique relatif aux pêcheries, et son équipement sera en rapport avec toutes ces opérations.

Il emportera 6 "Surveyors", afin de pouvoir exécuter sans interruption le travail de sondage, un hydrographe et un biologiste. Enfin d'autres installations pourront être établies pour d'autres hommes de science qui, de temps à autre, pourraient désirer prendre part à une croisière du navire.

Dr. Russell gave further information as to the scientific staff of this vessel.

Mr. Maurice remarked that accommodation for an extra scientist being available it might be possible to arrange for any accredited scientific representative to be accommodated on board the vessel if desired.

3) The Vice-Chairman outlined some extensions of the present programme which did not involve the activity of research ships or any material expense, namely collection of bottom fauna and fish stomachs from trawlers in the area as well as measurements and scales from species other than cod and haddock.

Dr. le Danois supported this proposal and announced that his Office would send a scientist along with one of the French trawlers working north of the Bear Island.

Dr. Russell said that an English scientist also would proceed in a trawler to Bear Island grounds.

The Chairman observed that under the greatly enhanced facilities for the work next year a programme could only be elaborated later on and asked for the authority of the Committee for himself and the Vice-Chairman to settle the programme by correspondence.

4) The Chairman and the Vice-Chairman were reelected for the ensuing year.

II. Recommendations.

1) That the Chairman and the Vice-Chairman, after correspondence with the members, frame plans for the cooperative work in the area for the discussion for the meeting of the Committee.
2) That the Vice-Chairman arrange by correspondence what material might be collected through the existing facilities in the meantime.

North Western Area Committee.

Mr. David T. Jones in the Chair.
The Committee met on May 29th, 1930 at 10.00 a. m.

I. Proceedings.

1) The Chairman intimated that as Prof. Schmidt had not yet concluded his world cruise on board the "Dana" he had undertaken the duty of conducting the business of the meeting.
2) The Administrative Report prepared by Prof. Schmidt for 1929 and circulated was submitted and approved.
3) A communication on a publication by Dr. Saemundsen was made by Prof. Ehrenbaum.
4) A brief account of researches during the expedition of the "Meteor" in the Denmark Strait in 1929 was given by Prof. Defant of Berlin. It had been found that phos-

Le Dr. Russell donne encore d'autres informations au sujet du personnel scientifique de ce navire.

M. Maurice fait remarquer que puisque l'accomodation pour un homme de science supplémentaire est prévue, il sera possible d'installer à bord tout représentant scientifique accrédité qui pourrait le désirer.

3) Le Vice-Président esquisse quelques extensions du programme actuel qui n'entraînent ni travail des navires de recherche ni aucune dépense matérielle, telles que la réunion de collections de la faune du fond et d'estomacs de poissons recueillis à bord des chalutiers dans le secteur, ainsi que des mensurations et des prélèvements d'écailles d'espèces autres que le cabillaud et l'aiglefin.

Le Dr. le Danois appuie cette proposition et annonce que son Office enverrait un homme de science sur un des chalutiers Français travaillant au Nord de l'Ile des Ours.

Le Dr. Russell dit qu'un homme de science Anglais pourrait aussi gagner à bord d'un chalutier les champs de pêche de l'Ile des Ours.

Le Président fait remarquer qu'étant donné la grande augmentation des moyens de travail pour l'année suivante, on ne pourra que plus tard élaborer un programme, et il demande du Comité, des pouvoirs pour lui-même et pour le Vice-Président en vue de l'élaboration de ce programme par correspondance.

4) Le Président et le Vice-Président sont réélus pour l'année suivante.

II. Recommandations.

1) Que le Président et le Vice-Président, après correspondance avec les membres, élaborent des plans de travail coopératif dans le secteur, à discuter lors de la réunion du Comité.

2) Que le Vice-Président arrange entre-temps par voie de correspondance, l'ensemble du matériel qui pourrait être réuni grâce à toutes les facilités obtenues.

Comité du Secteur Nord-Ouest.

Présidence de M. David T. Jones.
Le Comité se réunit le 29 Mai 1930 à 10h a. m.

I. Compte rendu.

1) Le Président annonce que, puisque le Prof. Schmidt n'a pas terminé sa croisière autour du monde à bord du "Dana", il assume encore la charge de conduire la réunion.

2) Le Rapport administratif préparé par le Prof. Schmidt pour 1929 et distribué est soumis au Comité et approuvé.

3) Une communication relative à une publication de M. Saemundsen est faite par le Prof. Ehrenbaum.

4) Un bref compte rendu de recherches faites au cours de l'Expédition du "Meteor" dans le Détroit de Danemark en 1929 est présenté par le Prof. Defant de Berlin. Il a été

phates and nitrates were most plentiful where the Atlantic and Polar waters meet, at places where the surface density is unusually high and eddies are formed.

The plankton was at a minimum in the S. Greenland Current and at a maximum in the Atlantic Current.

The maximum N_2O_5 and P_2O_5 was found in eddies between the currents, probably because the plankton was not abundant there.

Dr. Hjort drew Dr. Defant's attention to the somewhat similar distribution found in southern regions by the Discovery and suggested that the conditions should be compared.

Prof. Defant intimated that similar work would be extended by three more southerly lines during 1930.

5) Admiral Douglas described the work accomplished by H.M.S. "Rosemary" in a bathymetric survey of the waters between Faroe and Iceland. He intimated that further work was to be carried out in the area north-east of Iceland.

6) A series of charts and diagrams regarding racial investigations on the cod; fluctuations in the stock of cod in Icelandic waters; and the surface drift bottle experiments at Iceland was exhibited on behalf of Prof. Schmidt and a proof print of his report on the "Racial investigations of the Atlantic cod" was circulated.

7) Dr. Tesch informed the Committee that the Dutch authorities proposed to undertake a cruise to Jan Mayen during the summer when plankton and hydrographic observations would be made.

8) Dr. le Gall stated that the "Quentin Roosevelt" will repeat yearly investigations in Icelandic waters.

9) Prof. Schmidt was unanimously reelected Chairman of the Committee.

II. Recommendation.

That the four papers on Drift Bottle experiments in Icelandic waters, Cod-marking experiments, and other Cod investigations be published in the Area Report.

Atlantic Slope Committee.

Chairman: Dr. Ed. le Danois.
Vice-Chairman: Prof. Rafael de Buen.
The Committee met on May 28th, 1930, at 10 a.m.

I. Proceedings.

1) The Chairman gave an account of the work accomplished by the various countries during the year 1929; this work will be dealt with in the Rapport Atlantique 1929.
2) Dr. le Danois informed the Committee that Prof. Schmidt had had the kindness to ask what observations might be usefully made by the "Dana" when that vessel

trouvé que les phosphates et les nitrates étaient le plus abondants là où s'unissent les eaux Atlantiques et les eaux Polaires, en des endroits où la densité à la surface est anormalement haute et où des tourbillons se forment.

Le plancton était à son minimum dans le courant du Sud du Groenland et à son maximum dans le courant Atlantique.

Le maximum du N_2O_5 et du P_2O_5 a été trouvé dans les tourbillons entre les courants probablement parce que le plancton n'y était pas abondant.

Le Dr. Hjort appelle l'attention du Dr. Defant sur la distribution assez semblable qui a été trouvée par le Discovery dans les régions du Sud et suggère que les conditions devraient être comparées.

Le Prof. Defant signale que du travail semblable sera étendu sur trois lignes plus méridionales en 1930.

5) L'Amiral Douglas décrit le travail accompli par le "Rosemary" au cours d'une exploration bathymétrique des eaux entre les Faroe et l'Islande. Il annonce que le travail sera continué dans l'aire qui est au Nord-Est de l'Islande.
6) Une série de cartes et de diagrammes relatifs à l'investigation des races du cabillaud, aux fluctuations du stock dans les eaux d'Islande, et aux expériences sur la dérive des flotteurs de surface en Islande, est exhibée au nom du Prof. Schmidt et une épreuve de son rapport sur les "Investigations raciques du Cabillaud Atlantique" est distribuée.
7) Le Dr. Tesch fait connaître au Comité que les Autorités Hollandaises se proposent d'entreprendre une croisière à Jean Mayen pendant l'été, des observations planctoniques et hydrographiques y seront faites.
8) Le Dr. le Gall annonce que le "Quentin Roosevelt" reprendra des investigations annuelles dans les eaux Islandaises.
9) Le Prof. Schmidt est réélu, à l'unanimité Président du Comité.

II. Recommandation.

Que les quatre travaux sur la dérive des flotteurs dans les eaux Islandaises, sur les expériences de marquage du cabillaud et d'autres investigations concernant le cabillaud soient publiés dans le Rapport du Secteur.

Comité du Plateau Continental Atlantique.

Président: Dr. le Danois.
Vice-Président: Prof. Rafael de Buen.
Le Comité se réunit le 28 mai 1930 à 10h a. m.

I. Compte rendu.

1) Le Président indique les travaux accomplis pendant l'année 1929 par les différents Etats; ces travaux feront l'objet du Rapport Atlantique 1929.
2) Le Dr. le Danois annonce au Comité que le Prof. Schmidt a bien voulu demander quelles observations pourraient être utilement faites par le "Dana" au moment où

traversed the research area of the Committee; Dr. le Danois had begged Prof. Schmidt to give his attention to deep water researches, off the Bay of Biscay.

The Committee tendered, in advance, its thanks to Prof. Schmidt.

3) The programme of the Committee was gone through and various modifications were made resulting in the programme given below.
4) Admiral Douglas presented a bathymetrical chart of the Rockall Banks recently worked out by the British Admiralty.
5) Mr. Matthews furnished interesting explanations with regard to a hydrological section in the same region.
6) Dr. Ramalho exhibited the results of his observations in the neighbourhood of the Straits of Gibraltar. An important discussion on the penetration of Mediterranean waters into the Atlantic followed, in which Drs. Ramalho, R. de Buen, Bruno Schulz and le Danois took part.
7) Prof. Odón de Buen mentioned that an Iberian-American Council to comprise Spain, Portugal and the South American Republics had been started; he asked that their publications might be received in exchange for the publications of the International Council.
8) The Chairman and the Vice-Chairman were re-elected for the ensuing year.

II. Recommendations.

1) With a view to continuing the study of the hydrographical and biological conditions in the Bay of Biscay periodical quarterly cruises will be made by the Governments of France, Spain and the Irish Free State, the cruises being as follows:—

Spain:	8° W. from the coast to 47° N.
	6° W. from the coast to 44°30′ N.
	Along the 43° N. from the coast to 10° W.
France:	From Ushant to 9° W. (49° N.).
	9° W. from 49° N. to 47° N.
	From 47° N. (9° W.) to Ushant.
Ireland:	8° W. from the coast to 49° N.
	49° N. between 8° and 9° W.
	9° W. from 49° N. to the coast of Ireland.

These cruises will be undertaken during the months of February, May, August and November.

During each cruise deep sea observations will be made at one or more stations off the Atlantic Slope; if possible from the surface to the bottom. The cruises will be utilized for plankton observations.

2) The study of the western Channel will be undertaken by the British Government, in the form of periodical cruises by the vessel of the Marine Biological Association.

ce navire traversera la zone d'études du Comité; le Dr. LE DANOIS a prié le Prof. SCHMIDT de porter son attention sur les recherches en eau profonde, au large du Golfe de Gascogne.

Le Comité exprime par avance ses remerciements au Prof. SCHMIDT.

3) Le programme du Comité est ensuite étudié dans son ensemble et diverses modifications sont apportées pour l'établissement du programme ci-dessous.

4) L'Amiral DOUGLAS présente une carte bathymétrique de bancs de Rockall nouvellement établie par l'Amirauté Britannique.

5) M. MATTHEWS fournit d'intéressantes explications à propos d'une section hydrologique dans la même région.

6) Le Dr. RAMALHO expose les résultats de ses observations dans la région du détroit de Gibraltar. Suit une importante discussion sur la pénétration des eaux d'origine méditerranéenne dans l'Atlantique à laquelle prennent part les Drs. RAMALHO, R. DE BUEN, BRUNO SCHULZ et LE DANOIS.

7) Le Professeur ODÓN DE BUEN signale la création d'un Conseil Ibéro-Américain qui doit grouper l'Espagne, le Portugal et les Républiques de l'Amérique latine et présente les premiers travaux de ce Conseil; il demande que ces travaux soient reçus en échange des publications du Conseil International pour l'Exploration de la Mer.

8) Le Président et le Vice-Président sont réélus pour l'anné suivante.

II. Recommandations.

1) En vue de continuer l'étude des conditions hydrographiques et biologiques du Golfe de Gascogne, des croisières périodiques trimestrielles seront effectuées par les gouvernements de la France, de l'Espagne et de l'Etat Libre d'Irlande, dans les conditions suivantes:

Espagne: 8° W. G. de la côte jusqu'au 47° N.
6° W. G. de la côte jusqu'au 44°30′ N.
le long du 43° N. de la côte jusqu'au 10° W. G.
France: d'Ouessant au 9° W. G. (49° N.)
9° W. G. du 49° N. au 47° N.
du 47° N. (9° W.) à Ouessant.
Irlande: 8° W. G. de la côte au 49° N.
49° N. entre 8° et 9° W. G.
9° W. G. du 49° N. à la côte d'Irlande.

Ces croisières seront effectuées aux mois de février, mai, août et novembre.

A chaque sortie, une ou plusieurs stations comprendront des observations en eau profonde; si possible de la surface au fond, en dehors du Plateau continental. Les sorties seront utilisées pour des pêches planctoniques.

2) L'Etude de la Manche Occidentale sera faite par les soins du Gouvernement de la Grande-Bretagne sous forme de croisières périodiques, exécutées par le navire de la "Marine Biological Association".

3) The Irish Free State will undertake cruises to the southwest of Ireland with a view to determining the position of the 35.5 $^0/_0$ isohaline.

4) The investigations of the Committee in the waters of the Canaries will be continued by the new Spanish laboratory in these islands.

5) The investigations in the Bay and the Straits of Gibraltar will be continued by Spain.

6) The investigations in the Straits of Gibraltar will be made in accordance with those of the Mediterranean Commission.

7a) In order to continue the investigations on tunny Messrs. Belloc, Frade and Fernando de Buen will each prepare a report for the next meeting of the Committee, giving the methods of ichthyometrical measurements that can be applied to the racial study of these scombrids.

b) In consequence of the principle stated in the course of the biological conferences held at the present meeting of the International Council the Committee decided to request that a special meeting of experts be held at Lisbon, next autumn, with a view to arrive at a unification of ichthyometrical methods applicable to the study of the sardine races. The appointed experts are: Messrs. Belloc and le Gall (France), F. de Buen and Alaejos (Spain), Ramalho (Portugal) and one from Great Britain.

c) The investigations on the hake will be continued in their present form; moreover a cruise of the "George Bligh" will be arranged in August. This cruise will allow of observations on the size of the meshes in the trawls.

8) The investigations regarding the races of herring will be continued in the western Channel and in the waters to the south-west of the British Isles.

From the comparative observations made on the trawling grounds of the Fladen, of the North Sea, of the Smalls and of Inishtrahull it appears that these various grounds present a community of characteristics, i.e.

a) as regards herring, that the fish living on these grounds are in a state of prematuration.

b) as regards hydrology, that the waters are at the transgressive limit of the isohaline 35 $^0/_{00}$.

c) as regards bathymetrics, that the grounds lie at the limit of the "mud-line" of Murray.

d) as regards plankton, that the species which occur here show the predominance of Meganyctiphanes. Consequently, the Committee asked that a detailed study, specially concerning the grounds of the Smalls and of Inishtrahull, be made in these waters in order to procure new information bearing on the general biology of the herring. Messrs. le Gall and Watkins will be specially charged with this study.

9a) The method of biological statistics will in a very high degree be applied to all questions studied by the Committee.

b) It is desirable that the hydrological observations be accompanied by biological observations, since certain species are characteristic of definite ranges of depth or of definite physico-chemical conditions.

3) L'Etat Libre d'Irlande exécutera des croisières au Sud-Ouest de cette île afin de préciser la position de la ligne isohaline 35,5 $^{0}/_{00}$.

4) Les études du Comité dans la région des Canaries seront continuées par le nouveau laboratoire espagnol de ces îles.

5) Les études dans la baie et le détroit de Gibraltar seront continuées par l'Espagne.

6) Les recherches dans le détroit de Gibraltar seront effectuées en accord avec celles de la Commission de la Méditerranée.

7a) En vue de continuer les études sur les thons, MM. Belloc, Frade et Fernando de Buen fourniront chacun un rapport pour la prochaine réunion du Comité, précisant les méthodes de mensurations ichthyométriques applicables à l'étude ethnique de ces Scombridés.

b) Comme suite au principe énoncé au cours des conférences biologiques faites à la présente session du Conseil International le Comité décide de demander au Conseil International qu'une réunion spéciale d'experts se tienne à Lisbonne, en automne prochain, pour arriver à l'unification des méthodes ichthyométriques applicables à l'étude des races de sardines. Les experts désignés seront: MM. Belloc et le Gall (France), F. de Buen et Alaejos (Espagne), Ramalho (Portugal) et un expert britannique.

c) Les études sur le merlu seront continuées sous leur forme actuelle; de plus il est prévu une croisière du navire "George Bligh" au mois d'août. Cette croisière permettra des observations sur la dimension des mailles des chaluts.

8) Les études des races de hareng seront continuées en Manche Occidentale et dans la région sud-ouest des îles Britanniques.

Il résulte des observations comparatives effectuées sur les fonds de chalutage des Fladen, de la Mer du Nord, des Small's et d'Inishtrahull, que ces différents fonds présentent une communauté de caractères, à savoir:

a) au point de vue du hareng, que ces poissons se trouvent en état de prématuration sur ces fonds.

b) au point de vue hydrologique, que les eaux sont à la limite transgressive de l'isohaline 35 $^{0}/_{00}$,

c) au point de vue bathymétrique, que ces fonds se trouvent à la limite de la "mud-line" de Murray,

d) au point de vue planktonique, que les espèces qui s'y remontrent marquent la prédominance des Meganyctiphanes. En conséquence le Comité demande qu'en ce qui concerne particulièrement les fonds des Smalls et d'Inishtrahull une étude détaillée soit effectué dans ces régions en vue d'apporter de nouvaux renseignements à la biologie générale du hareng. MM. le Gall et Watkins seront spécialement chargés de cette étude.

9a) La méthode des statistiques biologiques sera appliquée dans une très large mesure à toute question étudiée par le Comité.

b) Il est désirable que les observations hydrologiques soient accompagnées d'observations biologiques étant donné que certaines espèces sont caractéristiques de niveaux déterminés ou de conditions physicochimiques précises.

10) Plankton studies will be undertaken during the various cruises in order to collect information on the plankton which forms the food of whales.
11) A service of rapid information will be organised among the members of the Committee after each cruise. Provisional lists of temperatures and final lists of salinities will be despatched by each member of the Committee to his colleagues as soon as he has received the communications in question.
12) A study on the marketable size of the fish will be undertaken by the Committee in the various countries, based upon the first sexual maturity of the bottom species, i.e. the hake, the flat fish etc. Reports and suggestions on this question will be furnished at the next Committee Meeting by Messrs. Hickling (Great Britain), le Danois (France), Odón and F. de Buen (Spain), Ramalho (Portugal).
13) The illustrations of the Atlantic Fauna will be continued to be published by the International Council under the direction of Prof. Joubin under the present conditions.

Combined North Sea Committe.

Chairman: Mr. David T. Jones.
Vice-Chairman: Professor G. Gilson.
The Committee met on 29th and 30th May 1930 at 10 a.m. and 1 p.m. respectively.

I. Proceedings.

1) Mr. Buchanan-Wollaston communicated a paper illustrated by photographs and specimens of otoliths on the use of otolith reading as an indication of age and rate of growth of fishes. A valuable discussion followed.
2) The Committee unanimously reelected Mr. David T. Jones and Professor Gilson to be Chairman and Vice-Chairman respectively.

II. Recommendations.

1) That on the proposal of the Southern North Sea Committee, a meeting of herring experts should be convened at Lowestoft in the autumn to discuss standardisation of methods and further cooperation.
2) That a subject for discussion at the Biological Meetings next year should be "The effect on the stock of the capture of undersized fish."

Northern North Sea Committee.

Chairman: Dr. Alexander Bowman.
The Committee met on May 29th at 11.45 a.m. and on May 30th at 9.30 a.m.

I. Proceedings.

1) The Administrative Report for 1929 was adopted.
2) Haddock. A paper was communicated by Dr. Harold Thompson on the methods at present being employed in Scotland of investigating quantitatively the food of the haddock.

10) Des études planctoniques seront effectuées au cours des diverses sorties en vue de recueillir des renseignements sur le plancton servant de nourriture aux cétacés.
11) Il sera organisé un service d'information rapide entre les membres du Comité après chaque sortie des navires. Des listes provisoires avec les températures, et définitives avec les salinités seront adressées par chaque membre du Comité à ses collègues aussitôt que les renseignements en question seront en sa possession.
12) Une étude sur la taille marchande des poissons sera entreprise par le Comité dans les différents Etats, en se basant sur la première maturité sexuelle des espèces de fond, notamment du merlu, des poissons plats etc. Des rapports et suggestions seront fournis à la prochaine réunion du Comité sur cette question par MM. Hickling (Grande Bretagne), le Danois (France), Odón et F. de Buen (Espagne), Ramalho (Portugal).
13) Les fiches faunistiques continueront à être éditées par le Conseil International sous la direction de M. le Professeur Joubin, dans les conditions actuelles.

Comité Combiné de la Mer du Nord.

Président: M. David T. Jones.
Vice-Président: Le Professeur Gilson.
Le Comité se réunit le 29 et le 30 Mai 1930 à 10h a. m. et à 1h p. m. respectivement..

I. Compte rendu.

1) M. Buchanan Wollaston présente un travail accompagné de photographies et de spécimens d'otolithes, sur la lecture de l'otolithe en tant qu'indication de l'âge et de la rapidité de croissance des poissons. Une importante discussion y fait suite.
2) Le Comité réélit à l'unanimité M. David T. Jones et le Professeur Gilson, respectivement Président et Vice-Président.

II. Recommandations.

1) Que sur la proposition du Comité du Sud de la Mer du Nord, une réunion des experts du hareng soit convoquée à Lowestoft en automne, pour discuter la standardisation des méthodes et la coopération ultérieure.
2) Qu'un sujet de discussion pour la Réunion biologique de l'année prochaine soit: l'Effet de la capture du poisson de taille inférieure, sur le stock.

Comité du Nord de la Mer du Nord.

Président: Le Dr. Alexander Bowman.
Le Comité se réunit le 29 Mai à 11h45 a. m. et le 30 Mai à 9h30 a. m.

I. Compte rendu.

1) Le Rapport administratif pour 1929 est adopté.
2) Aiglefin. Un travail est présenté par le Dr. Harold Thompson sur les méthodes employées aujourd'hui en Ecosse dans l'investigation quantitative de la nourriture de l'aiglefin.

It was agreed that it is desirable to increase the present degree of sampling of the various year classes of Haddock in the North Sea, especially in the southern and eastern portions of the area. The representatives of England, France, Holland, Germany, Denmark and Sweden outlined the assistance they were prepared to give in this connection, and also to what extent they would contribute to the study of the food of the haddock.

3) Herring. It was intimated that a paper by Mr. Henry Wood, entitled "Scottish Herring Shoals. Pre-spawning and spawning movements" will shortly be published, being now in the press.

The question of means for effecting the standardisation of methods used in Herring Investigations was referred to the meeting of the Southern North Sea Committee. It was also referred to that Committee to consider what steps could be taken to increase the means at present existing of determining the dispersal of the larvae from the autumn spawning grounds, especially that of the larger larvae from more northern grounds towards the Jutland coast.

4) Plaice. Dr. A. Bowman gave a preliminary account of investigations in Scottish coastal waters, with special reference to marking experiments at Shetland; to changes in the composition of the stock of small plaice in inshore waters; and to transplantation experiments.

5) Hydrography. Dr. J. N. Carruthers read a paper by Mr. J. B. Tait, dealing with results of Scottish surface drift bottle experiments.

Dr. Bowman invited the critical consideration of the validity of the methods described and utilised in Mr. Tait's papers, prior to their use on a larger scale.

Prof. van Everdingen offered to investigate the possibility of having his current measurements for the year 1910 (the year chiefly referred to in Mr. Tait's first paper) worked up in order to determine what degree of confirmation of Mr. Tait's results they would afford. This offer was accepted.

6) The consideration and recommendation of the subject for next year's Biological Meeting was referred to the meeting of the Southern North Sea Committee.

7) Dr. A. Bowman was reelected as Chairman for the coming year.

II. Recommendations.

1) That the Statistical Department of the Ministry of Agriculture and Fisheries be requested to extend to the north west and the west of Scotland their summarised returns of the total weights and average unit of time catches of Haddock.

2) That it be arranged to obtain data with reference to surface temperature observations on the line German Bight—Scottish Coast.

Le Comité reconnait qu'il est désirable que l'échantillonnage des diverses classes annuelles de l'aiglefin dans la Mer du Nord soit intensifié, spécialement dans des parties méridionales et orientales du Secteur. Les représentants d'Angleterre, de France, de Hollande, d'Allemagne, de Danemark, et de Suède esquissent l'assistance qu'ils sont prêts à donner à ce sujet et indiquent l'étendue de leur contribution éventuelle à l'étude de la nourriture de l'aiglefin.

3) Hareng. Il est annoncé qu'un travail par M. Henry Wood, intitulé: "Bancs de Harengs Ecossais. Déplacements précédant et accompagnant la ponte", est sous presse et sera bientôt publié.

La question des moyens d'arriver à une standardisation des méthodes employées dans les investigations sur le hareng est référée à la réunion du Comité du Sud de la Mer du Nord. Il est aussi référé à ce Comité d'examiner quelles mesures on pourrait prendre pour amplifier les moyens dont on dispose actuellement pour déterminer la dispersion des larves à partir des sièges de la ponte d'automne, et spécialement celles des larves les plus âgées à partir des sièges situés plus au Nord, vers la côte du Jutland.

4) Plie. Le Dr. Bowman donne un aperçu préliminaire sur les investigations faites dans les eaux côtières d'Ecosse avec mention spéciale au sujet des expériences de marquage aux Shetland, des changements de la composition du stock de petites plies dans les eaux littorales et des expériences de transplantation.

5) Hydrographie. Le Dr. J. N. Carruthers lit un travail de M. J. B. Tait traitant des résultats des expériences de dérive faites en Ecosse à l'aide de bouteilles de surface.

Le Dr. Bowman demande que l'on soumette à une étude critique la valeur des méthodes décrites et employées par M. Tait avant de les mettre en œuvre sur une plus large échelle.

Le Prof. van Everdingen offre d'étudier la possibilité de faire dès à présent l'étude de ses mesures de courants portant sur l'année 1910, (année à laquelle recourt principalement le premier travail de M. Tait) en vue de déterminer jusqu'à quel point ils pourraient confirmer les résultats de M. Tait. Cette offre est acceptée.

6) L'examen et la recommandation d'un sujet pour la Réunion Biologique de l'an prochain sont référés à la réunion du Comité du Sud de la Mer du Nord.

7) Le Dr. Bowman est réélu comme Président pour l'année prochaine.

II. Recommandations.

1) Que le département statistique du Ministère de l'Agriculture et des Pêcheries soit prié d'étendre au Nord-Ouest et à l'Ouest de l'Ecosse ses tables sommaires donnant le poids total et la moyenne des captures dans l'unité de temps, pour l'Aiglefin.

2) Que des dispositions soient prises pour obtenir des données de température de surface sur la ligne Mer Allemande—Côte d'Ecosse.

Southern North Sea Committee.

Chairman: Prof. W. Mielck.
The Committee met on May 30th at 11 a.m.

I. Proceedings.

1) The Administrative Report was adopted.

2) Scientific reports were laid before the Committee by:—
Dr. F. S. Russell: "Notes on oblique hauls with large ring nets".
F. M. Davis: "Note on Saving Trawls".
Communications were read by:—
Prof. Ehrenbaum: "Ueber den Hering am östlichen Eingang des englischen Kanals".
Jean le Gall: "Statistiques biologiques et considérations sur la population harenguière de la Manche orientale (Matériel prélevé en 1929)".

3) Plaice. It was agreed to continue and enlarge the annual survey of the offshore stock, by trawling experiments, the area of investigations being divided among the participating countries. The English collaborators are prepared to investigate the Leman-Haaks, and the Schiermonnikoog-Borkum Area, the German the Heligoland and Sylt area, the Danish the Graa Dyb and Horns Riff Area. The covered codend net in the form described by Davis (Jn. Cons. IV, 3, 1929) to be used by the collaborators. Investigations on the frequency and distribution of the 0- and I-groups to be carried out on the continental coast with Johansen's net. Market investigations as to age and length and market categories of the plaice landed, to be carried out as far as possible by all nations. Marking experiments carried out by England, started, if possible, also by other countries. Moreover it was suggested that otoliths of marked and recaptured plaice be either lent to the Lowestoft Laboratory for critical examinations according to the methods devised by Mr. Buchanan-Wollaston, or to be treated in the same way by the experts of each country.

4) Herring. It was agreed to continue the annual census of the stock according to the established methods. The investigation on the quantity and distribution of pelagic fry of the herring correlated with the relevant hydrographical and plankton conditions is considered as a problem of fundamental importance and should be started in 1931 in a close cooperation of the research vessels and laboratories. The similarities and differences between trawled and driftnet caught herring should be investigated. (Cf. Rec. 1).

5) Other fish. Additional investigations will be carried out on mackerel, whiting, sprat and sole.

6) With reference to Recommendation VII of the Sub-committee on North Sea Problems as to the effect upon other fish of the enlarged codend meshes proposed for haddock fishery, it was resolved that in the first place enquiries be made by all countries as to the meshes used in the commercial fishery. The result of these enquiries be handed over to Mr. Davis, who will send a questionnaire as to the data wanted,

Comité du Sud de la Mer du Nord.

Président: Le Prof. W. Mielck.
Le Comité se réunit le 30 Mai à 11h a.m.

I. Compte rendu.

1) Le Rapport administratif est adopté.
2) Des rapports scientifiques sont présentés au Comité par:
Le Dr. F. S. Russell: "Note sur les pêches obliques faites avec les grands filets circulaires".
M. F. M. Davis: "Note sur des engins épargneurs".
Des communications sont présentées par:
Le Prof. Ehrenbaum: "Sur le Hareng à l'entrée orientale de la Manche".
M. Jean le Gall: "Statistiques biologiques et considérations sur la population harenguière de la Manche orientale (Matériel prélevé en 1929)".
3) Plie. Il est décidé de continuer et d'amplifier la reconnaissance annuelle du stock du large par des expériences de chalutage, l'aire des investigations étant répartie entre les pays participants. Les collaborateurs Anglais sont prêts à examiner les aires Leman-Haaks et Schiermonnikoog-Borkum; les Allemands l'aire de Helgoland et de Sylt; les Danois les aires de Graa Dyb et de Horns Riff. Le filet avec arrière-fond couvert sous la forme décrite par Davis (Jn. Cons. IV, 3, 1929) sera employé par les collaborateurs. Des investigations sur la fréquence et la distribution des groupes 0 et I seront poursuivies à la côte continentale avec le filet de Johansen. Des investigations de marché au sujet de l'âge, de la taille et des catégories commerciales des plies débarquées seront conduites autant que possible par toutes les nations. Des expériences de marquage seront faites par l'Angleterre et entreprises aussi, si possible, par d'autres Pays. En outre, il est suggéré que les otolithes des plies marquées et recapturées soient, soit prêtées au laboratoire de Lowestoft pour y être soumis à un examen critique suivant les méthodes de M. Buchanan-Wollaston, soit traitées de la même façon par les experts de chaque pays.
4) Hareng. On convient de continuer le recensement du stock par les méthodes établies. Les recherches sur la quantité et la distribution du frai pélagique du hareng en rapport avec les conditions hydrographiques et planctoniques régnantes sont considérées comme d'une importance fondamentale; elles devraient être entamées en 1931 avec une étroite collaboration des navires de recherche et des laboratoires. Les similitudes et les différences entre le hareng chaluté et le hareng pris au filet dérivant doivent être examinées (Comp. Rec. 1).
5) Autres poissons. D'autres recherches seront poursuivies sur le maquereau, le merlan, l'esprot et la sole.
6) Au sujet de la recommandation VII du Sous-Comité des Problèmes de la Mer du Nord, relatives à l'effet produit sur d'autres poissons par l'élargissement des mailles de l'arrière-fond, proposé pour la pêche de l'aiglefin, il est décidé que des enquêtes préalables seront faites par tous les Pays sur les mailles employées par la pêche commerciale. Le résultat de ces enquêtes sera remis à M. Davis, qui enverra un

and report on the question at the next meeting. The size of the meshes is to be stated in rounds per meter.

7) It was resolved that the following suggestions be forwarded to the Hydrographical Committee:

That the continuous current investigations as carried out on the Varne Light Vessel be extended as to embrace light vessels on both sides of the Southern Bight.

That for surface sampling: A Danish line be restarted; a Hamburg—Grimsby line be instituted; new lines be instituted in the Northern North Sea.

8) It was resolved that short summaries of the results of the regular investigations regarding the abundance and the rate of growth of different year groups should be sent to the Chairman in time to be published in the Administrative Report.

9) The Chairman will collect the opinion of the members as to whether a special reporter should periodically be appointed to report on published work and other available data in any particular line of research. The Chairman will report on the matter at the next meeting of the Committee.

10) Item V of the recommendations of the Sub-committee on North Sea Problems was discussed. It was agreed that in the present state of knowledge the time is not ripe for organising a central service for the prediction of the future yield of plaice and herring.

11) The consideration and recommendation of the subject for next year's scientific meeting was referred to the Combined North Sea Committee.

12) Prof. Mielck was reelected Chairman.

II. Recommendations.

1) That a meeting of experts be held in the autumn of 1930 at Lowestoft to consider the standardisation of the methods employed in herring investigations. It was suggested that this meeting would afford a further opportunity for considering the question of cooperation in research on herring fry.

2) That the Statistical Committee be asked to consider the question of improvement of the collection of international plaice statistics in the North Sea Area.

Transition Area Committee.

Chairman: Dr. A. C. Johansen.

The Committee met on May 28th, 1930 at 11.30 a.m. and on May 29th at 2.30 p.m.

I. Proceedings.

1) Haddock. Dr. Andersson made a communication on the Swedish investigations concerning the occurrence of the different age-groups of the haddock in the Skagerak and Kattegat. Dr. Fischer reported on the occurrence of young haddock in the Lübeck Bay during the winter of 1929/30. A paper of Dr. Altnöder concerning this matter will be published shortly. Magister Poulsen dealt with the occurrence of young haddock in the southern part of the Belt Sea.

questionnaire indiquant les données désirées et qui fera rapport sur la question à la prochaine réunion. La grandeur des mailles sera indiquée en série par mètre.

7) Il est décidé que les suggestions suivantes seront adressées au Comité hydrographique:

Que les investigations continues sur les courants telles que celles qui sont faites à bord du bateau-phare Varne soient étendues à d'autres bateaux-phares sur les deux rives de la Baie du Sud.

Qu'en fait d'échantillons de surface, une ligne Danoise soit reprise et qu'une ligne Hambourg—Grimsby soit instituée, ainsi que de nouvelles lignes dans le Nord de la Mer du Nord.

8) Il est décidé que de brefs sommaires des observations régulières sur l'abondance et la rapidité de croissance des différents groupes annuels seront envoyés au Président en temps opportun pour leur publication dans le Rapport administratif.

9) Le Président prendra l'avis des membres au sujet de la désignation périodique d'un rapporteur spécial qui serait chargé de faire rapport sur les travaux publiés et sur d'autres données obtenues dans toute direction particulière de la recherche. Le Président fera rapport sur ce sujet à la prochaine réunion du Comité.

10) Le no. V des Recommandations du Sous-Comité des Problèmes de la Mer du Nord est discuté. Il est reconnu que dans l'état actuel de la connaissance la question de l'organisation d'un service central de la prévision de la production future en fait de hareng et de plie n'est pas encore mûre.

11) La recommandation d'un sujet de discussion pour la Réunion Scientifique de l'année prochaine est déférée au Comité combiné de la Mer du Nord.

12) Le Prof. Mielck est réélu Président.

II. Recommandations.

1) Qu'une réunion d'experts soit tenue en automne 1930 à Lowestoft pour examiner la standardisation des méthodes des investigations sur le Hareng. Il est suggéré que cette réunion pourrait fournir l'occasion d'examiner la question de la coopération dans la recherche du frai de hareng.

2) Que le Comité Statistique soit prié d'examiner la question de l'amélioration de la réunion des données statistiques internationales concernant la plie dans la Mer du Nord.

Comité du Secteur de Transition.

Président: Le Dr. A. C. Johansen.

Le Comité se réunit le 28 Mai, 1930 à 11^h30 a.m. et le 29 Mai à 2^h30 p.m.

I. Compte rendu.

1) Aiglefin. Le Dr. Andersson fait une communication sur les investigations Suédoises concernant l'occurrence de différents groupes d'âge de l'aiglefin dans le Skagerak et le Cattégat. Le Dr. Fischer fait rapport sur l'occurrence du jeune aiglefin dans la baie de Lubeck pendant l'hiver de 1929—30. Un travail du Dr. Altnöder concernant cette matière sera publié prochainement. Le Magister Poulsen traite de l'occurrence du jeune aiglefin dans la partie méridionale de la Mer des Belts.

2) Plaice. Dr. Johansen made a survey of the Report of the Transition Area Committee concerning Plaice-investigations in the Kattegat and Skagerak. Dr. Andersson, Dr. Bjerkan, Dr. Fischer, Magister Jensen, Dr. Johansen and Dr. Molander reported on the investigations carried out in each country concerned (see Recommendations II, 1, below).

3) Herring. Dr. Johansen made a communication on the cooperative work carried out by Denmark, Germany and Sweden in the autumn concerning the distribution of the larvae of the autumn spawning herring.

4) Sprat. Mr. Bjerkan proposed a continuation of the Norwegian work on the age and size composition of the stock of sprat and a colloboration with Sweden and Denmark especially regarding the young sprat in the autumn.

5) The programme of 1929 was reaffirmed with the view that the following points should be subjected to special studies:—
   a) The extent of the drift of the Haddock larvae from the North Sea to the Transition Area and the migrations of the mature Haddock in the opposite way. The age-compositions should also be studied in order to make predictions regarding the yield of the Haddock fishery.
   b) The variations in the frequency of the different age-groups of Herrings in order to make predictions about the yield of the fishery in certain parts of the area.

6) Dr. Johansen was reelected Chairman for the ensuing year.

II. Recommendations.

1) Having considered the report of the Transition Area Committee concerning Plaice investigations in the Kattegat and Skagerak, the Committee agreed that the stock of plaice in these waters need protection. As a practical measure in this direction the Committee considered the following steps advisable:—
   a) An introduction of a size limit of 27 cm. for Denmark, Norway and Sweden.
   b) A prohibition of trawling from steamers and large motor vessels belonging to Denmark, Germany, Norway and Sweden on the Plaice nursery grounds in the western Kattegat.

2) The Committee recommended that the above named report should be printed in the Rapports et Procès-Verbaux.

Baltic Committee.

Chairman: Dr. K. A. Andersson.
The Committee met on May, 28th 1930, at 2.30 p. m.

I. Proceedings.

1) The Administrative Report was adopted.
2) Dr. Strodtmann made a report on the German investigations on flatfishes in the southern Baltic and stated the great influence of the fishery upon the stock of these

2) Plie. Le Dr. Johansen passe en revue le Rapport du Secteur de Transition relatif aux investigations sur la plie dans le Cattégat et le Skagerak. Le Dr. Andersson, M. Bjerkan, le Dr. Fischer, le Magister Jensen, le Dr. Johansen et le Dr. Molander font rapport sur les investigations conduites dans les divers pays (voir Recommandation II, 1 ci-dessous).
3) Hareng. Le Dr. Johansen fait une communication sur le travail coopératif exécuté par le Danemark, l'Allemagne et la Suède, en automne, au sujet de la distribution des larves du hareng à ponte automnale.
4) Esprot. M. Bjerkan propose la continuation du travail Norvégien sur la composition en tailles du stock d'esprot et une collaboration avec la Suède et le Danemark, particulièrement au sujet du jeune esprot, en automne.
5) Le programme de 1929 est réadopté, en vue de faire soumettre à de nouvelles études les points suivants:
   a) L'extension de la dérive des larves de l'aiglefin de la Mer du Nord, vers le Secteur de Transition et les migrations de l'aiglefin mature en sens opposé. Sa composition en groupes d'âge devrait aussi être étudiée en vue de pouvoir formuler des prévisions au sujet de la production de la pêcherie de l'aiglefin.
   b) Les variations de la fréquence de divers groupes d'âge du hareng en vue de faire des prévisions au sujet de la production de la Pêcherie dans certaines parties du Secteur.
6) Le Dr. Johansen est réélu Président pour l'année suivante.

II. Recommandations.

1) Le Comité, après examen du rapport du Comité du Secteur de Transition relatif aux investigations sur la plie dans le Cattégat et le Skagerak estime que le stock de plie dans ces eaux a besoin de protection. Dans cette voie le Comité considère comme pratique l'établissement des mesures suivantes:
   a) L'introduction d'une taille minimale de 27 cm. pour le Danemark, la Norvège et la Suède.
   b) La prohibition du chalutage dans les nourrisseries de la plie du Cattégat occidental pour les steamers et les grands navires à moteur de Danemark, d'Allemagne, de Norvège et de Suède.
2) Le Comité recommande que le rapport sus-indiqué soit imprimé dans les Rapports et Procès-Verbaux.

Comité Baltique.

Président: Le Dr. K. A. Andersson.
Le Comité se réunit le 28 Mai, 1930 à 2h30 p.m.

I. Compte rendu.

1) Le Rapport administratif est adopté.
2) Le Dr. Strodtmann fait rapport au sujet des investigations Allemandes sur les poissons plats dans le Sud de la Baltique et établit la grande influence de la pêcherie

fishes. He urged strongly that measures should be taken for the protection also of the flounder.

3) Dr. JOHANSEN made a communication concerning fishing experiments for the 0-group of plaice at Bornholm. Very few specimens were found here, as was the case also in the western Baltic and the Belt Sea. He reported that the yield of the plaice and flounder fishery in the Bornholm Deep was smaller in 1929 than in previous years.

4) Dr. BUCH reported on the Finnish determinations of ammonia, nitrite, nitrate and phosphate contents in watersamples taken in the summers 1928 and 1929 at many stations in the Gulf of Bothnia and the Finnish Bay, and made some critical remarks on the methods used.

5) Professor SIEDLECKI gave a short account of the Polish investigations concerning the migrations of flatfishes, and reported a wide migration of the common dab. Further he spoke about the food of flatfishes in different seasons of the year and on different grounds. The feeding conditions in shallow water on the Polish coast appear to be very favourable. He pointed out some difficulties in the determinations of age of flounder by means of otoliths. Further he reported on experiments with a trawl provided with cover-net, on fishing of sprat with trawl and driftnet and on the relative abundance of both sexes in catches taken with the different gears. He also gave a communication upon the composition of the catches of salmonid fish with different gears, the migrations of two forms of sea trout and the marking experiments with salmon, sea trout and brook trout set out directly in the Baltic.

6) Dr. FISCHER reported on the establishment of control stations at the whole German Baltic coast for studying the effects of the international measures for protecting the flatfishes. He showed the direct relation between the occurrence of the 0-group and the results of the fishery some years later on.

7) Dr. MOLANDER dealt with the Swedish investigations on the flatfishes in the southern Baltic and pointed out that probably two types of flounder and plaice, with different rate of growth in the young stages could be distinguished.

8) Dr. ANDERSSON made a short communication as to the Swedish investigations on herring and salmon. He suggested that cooperation between the Baltic countries should be established for the purpose of a closer study of the fluctuations in the stock of herring. If such studies could be taken up on a wide basis it would probably prove practicable to make valuable predictions as to the herring fishery in the Baltic. Furthermore he urged the necessity of imposing an adequate size-limit for the salmon in the Baltic.

He suggested also that investigations as to ammonia, nitrite etc. contents should be carried on in different parts of the Baltic and that a cooperation with the Finnish scientists was desirable.

sur le stock de ces poissons. Il insiste fortement aussi sur la nécessité de la prise de mesures protectrices pour le flet.

3) Le Dr. Johansen fait une communication sur les expériences de pêche pour le groupe 0 de la plie à Bornholm. On a trouvé là très peu d'exemplaires comme c'était le cas aussi dans la Baltique occidentale et dans la Mer des Belts. Il rapporte que la production de la pêche de la plie et du flet dans le Fonds de Bornholm a été moindre en 1929 qu'au cours des années précédentes.

4) Le Dr. Buch fait rapport sur les déterminations Finlandaises de la contenance en ammoniaque, nitrites, nitrates et phosphates des échantillons d'eau prélevés pendant l'été en 1928 en 1929 en de nombreuses stations du Golfe de Bothnie et du Golfe de Finlande; il fait quelques remarques critiques au sujet des méthodes employées.

5) Le Prof. Siedlecki donne un court aperçu des investigations Polonaises au sujet des migrations des poissons plats et signale une migration très étendue du flet commun. En outre il parle de la nourriture des poissons plats en diverses saisons de l'année et sur différents fonds. Les conditions alimentaires dans les eaux peu profondes, sur la côte Polonaise semblent très favorables. Il signale certaines difficultés dans la détermination de l'âge du flet au moyen des otolithes. Il fait rapport aussi sur des expériences faites avec un chalut à arrière-fond couvert, sur la pêche de l'esprot au chalut et au filet dérivant et sur l'abondance relative des deux sexes dans les captures faites avec des engins divers. Il présente aussi une communication sur la composition des captures des salmonides faites avec divers engins, sur les migrations de deux formes de truite de mer et sur des expériences de marquage du saumon, de la truite de mer et de la truite de ruisseau transportée directement dans la Baltique.

6) Le Dr. Fischer fait rapport sur l'établissement de stations de contrôle sur toute la côte allemande de la Baltique, pour l'étude de l'effet des mesures internationales de protection des poissons plats. Il montre l'existence d'une relation directe entre l'occurence du groupe 0 et les résultats de la pêcherie quelques années plus tard.

7) Le Dr. Molander traite des investigations suédoises sur les poissons plats dans le Sud de la Baltique et signale qu'il y a probablement lieu de distinguer deux types de flet et de plie différant par la rapidité de leur croissance aux stades jeunes.

8) Le Dr. Andersson fait une courte communication au sujet des investigations Suédoises sur le hareng et le saumon. Il suggère qu'une coopération entre les Pays Baltiques devrait être établie en vue d'obtenir une étude plus serrée des fluctuations du stock des harengs. Si ces études pouvaient se faire sur une large base il deviendrait probablement praticable de faire d'utiles prédictions au sujet de la pêcherie du hareng dans la Baltique. En outre il insiste sur la nécessité d'imposer une taille minimale convenable pour le saumon dans la Baltique.

Il suggère aussi que des investigations sur la contenance en ammoniaque, nitrites etc. devraient être faites dans diverses parties de la Baltique et que la coopération des savants Finlandais serait désirable.

9) Mr. Miezis and Prof. Järvi reported on the salmon investigations in their countries and drew attention to the necessity of a higher size-limit for the salmon in the Baltic. In the course of discussion Mr. Miezis and Prof. Siedlecki also laid stress upon the importance of hatching of salmon and sea trout on a larger scale and of the protection of the spawning grounds. The Committee agreed with these opinions.

10) Dr. Andersson was reelected Chairman for the ensuing year.

II. Recommendations.

1) The Committee decided to continue the programme adopted in 1929 laying special stress upon the following points:—

a) A cooperation of the countries concerned should be established in order to study more closely the fluctuations of the stock of herring along the Baltic coast.

b) The studies concerning the question of the salmon in the Baltic by means of a higher minimum size should be continued in the different countries and should be reported upon at the next meeting.

c) The studies concerning the question of protectional measures for the flounder in the Baltic by means of size-limit and of a close time should be continued in the countries concerned, and reported upon at the next meeting.

d) The investigations as to the ammonia, nitrite, nitrate and phosphate contents of the water should be continued in different parts of the Baltic, as far as possible in cooperation between the countries. For this purpose the Finnish and Swedish expeditions in July should be arranged to coincide in the northern and middle part of the Baltic. Investigations of the same kind at selected places should be connected with studies on the plankton.

2) The Committee recommended that sturgeon be investigated as to its occurrence and importance for the fishery, with the aim of protecting this fish.

Combined Baltic and Transition Area Committees.

Dr. A. C. Johansen in the Chair.
The Committees met on May 29th, 1930 at 3.30 p.m.

I. Proceedings.

1) Dr. H. Blegvad: Quantitative Investigations on the Bottom Invertebrates of the Kattegat with special Reference to the Plaice Food.

9) M. Miezis et le Prof. Järvi font rapport sur les investigations relatives au saumon dans leurs Pays et attirent l'attention sur la nécessité d'une taille minimale plus élevée pour le saumon dans la Baltique. Au cours de la discussion M. Miezis et le Prof. Siedlecki insistent également sur l'importance de la fécondation artificielle ("hatching") du saumon et de la truite de mer pratiquée sur une large échelle et sur celle de la protection des champs de ponte. Le Comité est d'accord au sujet de ces diverses opinions.
10) Le Dr. Andersson est réélu Président pour l'année suivante.

II. Recommandations.

1) Le Comité décide de conserver le programme adopté en 1929, et insiste spécialement sur les points suivants:
   a) Une coopération des Pays intéressés devrait être établie, en vue d'étudier de plus près les fluctuations du stock de hareng le long de la côte de la Baltique.
   b) Les études relatives à la question du saumon dans la Baltique par la voie d'une élévation de la taille minimale devraient être poursuivies dans les divers Pays et un rapport à leur sujet devrait être présenté à la prochaine réunion.
   c) Les études relatives à la question des mesures protectives du flet dans la Baltique par la voie d'une taille minimale et d'une interdiction temporaire devraient être poursuivies dans les Pays intéressés et un rapport à leur sujet devrait être présenté à la prochaine réunion.
   d) Les investigations sur la contenance de l'eau en ammoniaque, nitrites, nitrates et phosphates, devraient être continuées en différentes parties de la Baltique, autant que possible par coopération entre les divers Pays. Dans ce but il faudrait arranger les expéditions Finlandaises et Suédoises de Juillet de manière à les faire coincider dans la partie Nord et la partie central de la Baltique. Des investigations du même genre en des endroits choisis devraient être faites en connexion avec des recherches planctoniques.
2) Le Comité recommande des investigations sur l'esturgeon portant sur son occurrence et sur son importance pour la pêcherie, dans le but de protéger ce poisson.

Comités Combinés de la Baltique et du Secteur de Transition.

Présidence du Dr. A. C. Johansen.
Les Comités se réunissent le 29 Mai 1930 à 3h30 p. m.

I. Compte rendu.

1) Le Dr. Blegvad: Investigations quantitatives sur les Invertébrés de fond du Cattégat avec mention spéciale de la nourriture de la plie.

2) Professor HENKING: The proportion between males and females of plaice in the western Baltic.
3) Dr. K. A. ANDERSSON: The protection of the fisheries in the Baltic against the plague of Seals.

II. Recommendation.

Investigations regarding the life history of the Turbot — including marking experiments — should be carried out in the Baltic and Transition Areas in order to get a basis for protective measures.

2) Le Prof. Henking: La proportion des mâles et des femelles de la plie dans la Baltique occidentale.
3) Le Dr. Andersson: La protection des Pêcheries dans la Baltique contre le fléau des phoques.

II. Recommandation.

Des investigations concernant la biologie du Turbot — y compris des expériences de marquage — devraient être faites dans la Baltique et dans le Secteur de Transition en vue d'obtenir une base pour des mesures protectives.

Programmes and Reports of other Committees.

Hydrographical Committee.

Chairman: Prof. M. KNUDSEN.

The Committee met on May 26th and 30th, 1930 at 4.00 p.m. and 4.30 p.m. respectively.

I. Proceedings.

1) Prof. KNUDSEN laid a memorandum from Dr. la COUR concerning the polar year 1932—33 before the Committee. The recommendation 1 was passed by the Committee.
2) Report on Bulletin Hydrographique was laid before the Committee.
3) Report on Salinity Normals in the North Sea was laid before the Committee and fully discussed.

The Committee considered that the procedure in drawing up the atlas of salinity normals is of such importance that full opportunity should be given for considering the further steps to be proposed by the Service Hydrographique (and called for under para. IV, p. 56, of R. et P.-V. June, 1928). To this end it is recommended that time be given for study of the report presented by Dr. J. P. JACOBSEN, and the steps suggested by the Service Hydrographique should be considered by the Sub-committee [Prof. SCHOTT (failing him Prof. B. SCHULZ), Mr. VAN RIEL (failing him Prof. VAN EVERDINGEN), Mr. LUMBY and Prof. KNUDSEN] previously engaged on the matter. The following points, among others, were referred to the Sub-committee:—

A) the format of the atlas,
B) precautions necessary to ensure that the results of the work done by the Service Hydrographique are published in a form enabling the satisfactory incorporation of later data for the future calculation of new means,
C) the publication of the tables upon which the charts are based in such a form that (a) the tables and charts can be used alternatively and independently of one another to give the same result, (b) the tables give the basic material (e. g., totals and divisors) from which the mean values have been obtained, so that all risk of losing the original computations is avoided.

4) A proposal by Mr. J. R. LUMBY on the elaboration of charts of isotherms for the North Sea 1905—14 based on the publication in the Bulletin Hydrographique 1922 was considered by the Committee.

It was considered that mean isotherm charts on the Mercator projection should be drawn to show curves for $^1/_{10}^\circ$ C. for each decade represented in the avail-

Programmes et Rapports des autres Comités.

Comité Hydrographique.

Président: le Professeur M. KNUDSEN.

Le Comité se réunit le 26 et le 30 Mai à 4h p.m. et à 4h30 p.m. respectivement.

I. Compte rendu.

1) Le Prof. KNUDSEN dépose un mémorandum du Dr. la COUR relatif à l'année polaire 1932—33. La recommandation 1 est adoptée par le Comité.

2) Le Rapport sur le Bulletin Hydrographique est soumis au Comité.

3) Le Rapport sur les Normales de Salinité dans la Mer du Nord est présenté au Comité et discuté à fond.

Le Comité considère le procédé de la construction de l'atlas des normales de salinité comme si important qu'il estime nécessaire que tout loisir lui soit laissé pour examiner les mesures ultérieures à proposer par le Service Hydrographique (mesures qui figurent au Par. IV, p. 57 des R. et Proc.-Verb. Juin 1928). A cette fin il est recommandé que le temps nécessaire soit accordé pour l'étude du rapport présenté par le Dr. J. P. JACOBSEN, et que les mesures proposées par le Service Hydrographique soient prises en considération par le Sous-Comité, [Le Prof. SCHOTT (à son défaut le Prof. B. SCHULZ), M. VAN RIEL (à son défaut le Prof. VAN EVERDINGEN), M. LUMBY et le Prof. KNUDSEN], qui a été précédemment engagé dans la matière. Les points suivants, entre autres, sont référés à ce Sous-Comité.

A) Le format de l'atlas,

B) les précautions nécessaires pour donner l'assurance que les résultats du travail exécuté par le Service Hydrographique seront publiés sous une forme permettant d'incorporer d'une manière satisfaisante les dernières données utilisables pour le calcul des nouvelles moyennes,

C) la publication des tables servant de base aux cartes, sous une forme telle que: (a) les tables et les cartes puissent être employées alternativement et indépendamment l'une de l'autre et donner les mêmes résultats; (b) que les tables donnent le matériel basal (entre autres les totaux et les diviseurs) dont les valeurs moyennes ont été obtenues, de façon à éviter tout risque de perdre les computations originelles.

4) Une proposition de M. J. R. LUMBY relative à l'élaboration de cartes d'isothermes pour la Mer du Nord de 1905 à 1914, basées sur la publication du Bulletin Hydrographique de 1922, est prise en considération par le Comité.

Il est estimé que des cartes d'isothermes moyennes sur la projection de Mercator, montrant les courbes des 10èmes de degré C, devraient être dressées pour

able data (1922 Bulletin). These charts should be published in that size chosen for the salinity normal atlas and should be based upon, and tally with, the tables which occur in the bulletin concerned. Since this matter has been fully gone into between the Service Hydrographique and the English workers in lengthy detailed correspondence and by the exchange of sample charts drawn up by each side, it seems better that the mean isotherm charts be prepared and published in the form agreed upon.

5) A report on the registering of hydrographical material available from the Faroe-Shetland Channel was presented by Mr. Lomholt; no definite suggestions for further action in the immediate future were made.

6) The Chairman of the Sub-committee on sub-marine waves in the Cattegat and the Belt Sea (Prof. Schulz) reported that the investigations were not to be undertaken in 1930 and that it is contemplated to carry them out in 1931 at first from lightships. It was thought that it might be necessary to call a special meeting some time during the year. Resolution No. 4 was adopted.

7) The representatives of the various countries with a few exceptions presented their present programmes on the Hydrographical investigations in the different countries during the coming year.

8) Professor Schulz presented certain recommendations from the Southern North Sea Committee. These called for continuous current measurements along the continental coast analogous to those made at the Varne L. V., and for the initiation of extra surface sampling lines in the North Sea. The German, Dutch and French representatives promised to give the recommendation their best attention. It was agreed, as the result of remarks made by Mr. Sund, that the technique of surface sampling should be dealt with adequately in correspondence between the Service Hydrographique and the various countries.

9) It was resolved that at the next scientific meeting, the following subjects should be dealt with:— "The mixing question viewed theoretically and practically, together with a consideration of internal waves". It was decided to invite certain experts to the meeting and to arrange that the relevant papers be printed and circulated two months beforehand.

10) Mr. Oscar Sund made a communication relating to the measurement of p_H.

11) Drs. Buch, Giral and Schulz proposed that a meeting be held in Helsingfors to organise the investigations to be made upon the "Kohlensäurefaktoren im Meerwasser" (see App. to Rec. 5). It was agreed that Professor Giral and Dr. K. Buch should correspond on this matter.

12) Professor Giral laid on the table a communication entitled "Détermination des composés azotés dans l'eau de Mer" by Giral and Ibanez. It was resolved that this paper be published in the report of the scientific meeting.

13) Professor Schulz told the Committee that Dr. Wattenberg was able to say where the purest chemicals for the determination of the nitrogen and phosphate contents of sea water could be procured. It was decided that the addresses of the firms

chaque décade portant sur les données que l'on possède (Bulletin de 1922). Ces cartes devraient être publiées dans le format choisi pour l'atlas des normales de salinité. Elles devraient être basées sur les tables contenues dans le bulletin correspondant et leur être conformes. Comme cette matière a été traitée à fond dans une correspondance longue et détaillée échangée entre le Service Hydrographique et les travailleurs Anglais, avec communication de cartes specimens dressées par chacune des parties, il semble indiqué que les cartes des isothermes moyennes soient préparées et publiées sous la forme agréée par eux.

5) Un rapport sur l'inscription du matériel hydrographique obtenu du Canal Faroe-Shetland est présenté par M. Lomholt. Il n'a pas été formulé de proposition au sujet d'une action immédiate.

6) Le Président du Sous-Comité pour l'étude des vagues sous-marines dans le Cattégat et la Mer des Belts (le Prof. Schulz) rapporte que les investigations ne seront pas entreprises en 1930 et qu'il est projeté de commencer par les conduire, en 1931, à bord des bateaux-phares. On pense qu'il pourrait devenir nécessaire de convoquer une réunion spéciale à une certaine époque de l'année. La Résolution no. 4 est adoptée.

7) Les représentants des divers Pays, à peu d'exceptions, présentent leur programme pour les recherches hydrographiques pendant l'année suivante.

8) Le Prof. Schulz présente certaines recommandations du Comité du Sud de la Mer du Nord. Celles-ci demandent des mesures continues de courants le long de la côte continentale, analogues à celles qui sont faites au B. P. Varne et l'installation de plusieurs lignes d'échantillonnage de surface dans la Mer du Nord. Les représentants Allemands, Hollandais et Français promettent d'attacher leur attention à cette recommandation. A la suite de remarques formulées par M. Sund, on convient que la technique de l'échantillonnage de surface devrait être traitée avec concordance exacte entre le Service Hydrographique et les divers Pays.

9) Il est décidé que les sujets suivants seront traités à la prochaine Réunion Scientifique: "La question du mélange, examinée théoriquement et pratiquement, et avec prise en considération des vagues internes". On convient d'inviter certains experts à la Réunion et à prendre des dispositions pour que les travaux soient imprimés et distribués deux mois d'avance.

10) Mr. Oscar Sund fait une communication relative à la mesure du p_H.

11) Les Drs. Buch, Giral et Schulz proposent qu'une réunion soit tenue à Helsingfors pour organiser des investigations à faire sur les "Facteurs de l'acide carbonique dans l'eau de mer" (voir App. de la Rec. 5). On convient que le Prof. Giral et le Dr. K. Buch correspondront à ce sujet.

12) Le Prof. Giral dépose sur la table une communication intitulée: "Détermination des composés azotés dans l'eau de mer" par Giral et Ibanez. Il est décidé que ce travail sera publié dans le Rapport de la Réunion Scientifique.

13) Le Prof. Schulz communique au Comité que le Dr. Wattenberg est à même d'indiquer où l'on peut se procurer les produits chimiques les plus purs pour la détermination de la contenance de l'eau de mer en azote et en phosphates. Il est décidé

concerned should be deposited with the Service Hydrographique and forwarded to the cooperating countries.

14) Mr. D. J. Matthews made a communication concerning a table which he has calculated for the rapid determination of density of water.

15) Professor Knudsen was re-elected Chairman for the ensuing year.

II. Recommendations.

1) Having been informed that a "Commission de l'année Polaire 1932—33" has been formed with the object of making geophysical researches in the polar regions the Committee recommends that the Council appoint a provisional Committee consisting of Prof. Knudsen, Prof. van Everdingen and Prof. Witting. The duties of this Committee should be:—
   a) to consider what, from an oceanographical point of view, should be done in the polar year,
   b) to keep in contact with the International Commission on behalf of the Council,
   c) to report to the next year's Council Meeting.

2) The Hydrographical Committee having heard and discussed the report from the Service Hydrographique on the progress made concerning the establishment of North Sea salinity normals strongly recommends that this work be continued. To this end it considers that the matter should be placed in the hands of the Sub-committee previously engaged on the subject [Prof. Schott (failing him Prof. B. Schulz), Mr. van Riel (failing him Prof. van Everdingen), Mr. Lumby, Prof. Knudsen].

3) The proposal of Mr. J. R. Lumby concerning the elaboration of charts of isotherms for the North Sea 1905—14 based on the publication in the Bulletin Hydrographique 1922 having been fully considered by the Hydrographical Committee it was strongly recommended that the Service Hydrographique should proceed with the work.

4) The Hydrographical Committee recommends to the Council the following recommendation.

   That, in order to investigate the exchange of water between the North Sea and the Baltic it will be best first to consider, by the cooperative work of various vessels, the quality of the internal waves and the changes of the water layers; the time for this work might be August 1931, and it is calculated that the operations will take approximately one week. The investigations should be made by the countries interested in the subject. The programme should be elaborated by the existing Subcommittee which will meet, if necessary.

5) The Hydrographical Committee approved of the following proposal laid before it by Dr. K. Buch, Prof. J. Giral and Prof. B. Schulz (see Appendix).

6) The Hydrographical Committee decided to recommend as a subject for the next year's scientific meeting:— "The mixing question viewed theoretically and practically together with a consideration of internal waves". It was recommended that Professors V. W. Ekman, G. I. Taylor and Dr. H. Thorade be asked to take part in the meeting.

que l'adresse des firmes en question sera déposée au Service Hydrographique et envoyée aux divers Pays.

14) Mr. D. J. Matthews fait une communication au sujet d'une table qu'il a calculée pour la détermination rapide de la densité de l'eau.

15) Le Professeur Knudsen est réélu Président pour l'année suivante.

II. Recommandations.

1) Le Comité ayant reçu l'annonce de la constitution d'une "Commission de l'année polaire 1932—33" chargée de faire des recherches géophysiques dans les régions polaires, recommande que le Conseil nomme un Comité provisoire composé des Professeurs Knudsen, van Everdingen et Witting. Les charges de ce Comité seraient:

a) d'examiner ce qui, au point de vue océanographique, devrait être fait dans l'année polaire;

b) de prendre contact avec la Commission internationale, au nom du Conseil;

c) de faire rapport à la prochaine réunion du Conseil.

2) Le Comité Hydrographique ayant entendu et discuté le rapport du Service Hydrographique sur les progrès réalisés au sujet de l'établissement des normales de salinité de la Mer du Nord, recommande vivement la continuation de ce travail. A cette fin il estime que la matière devrait être confiée aux mains du Sous-Comité qui a été précédemment engagé dans la question [le Prof. Schott (à son défaut le Prof. Schulz), M. van Riel (à son défaut le Prof. van Everdingen), M. Lumby et le Prof. Knudsen].

3) La proposition de M. Lumby concernant l'élaboration de cartes des isothermes pour la Mer du Nord en 1905—14 basées sur la publication faite dans le Bulletin Hydrographique de 1922, ayant été examinée à fond par le Comité Hydrographique, il est vivement recommandé que le Service Hydrographique procède au travail.

4) Le Comité Hydrographique présente au Conseil la recommandation suivante:

Que, dans le but d'étudier l'échange des eaux entre la Mer du Nord et la Baltique, il serait bon d'examiner d'abord, par la coopération de plusieurs navires, les allures des vagues internes et les changements de composition des couches d'eau. Le temps opportun pour ce travail pourrait être Août 1931 et on compte que les opérations prendraient environ une semaine. Les investigations devraient être faites par les Pays intéressés dans la question. Le programme devrait être élaboré par le Sous-Comité existant qui se réunira, si c'est nécessaire.

5) Le Comité Hydrographique approuve une proposition qui lui est soumise par le Dr. K. Buch, le Prof. J. Giral et le Prof. Schulz (voir Appendice).

6) Le Comité Hydrographique décide de recommander comme sujet pour la Réunion scientifique de l'an prochain: "La question du mélange envisagée théoriquement et pratiquement en tenant compte des vagues internes". Il est recommandé que les Professeurs V. W. Ekman et G. I. Taylor et le Dr. H. Thorade soient invités à prendre part à la réunion.

7) Having considered a communication by Mr. D. J. MATTHEWS in which he gave details of a table drawn up by him for the rapid calculation of density and shewed a specimen page in manuscript, the Committee recommends that the tables be published. All necessary details should be arranged by correspondence between Mr. MATTHEWS and the Service Hydrographique.

Appendix.

Proposal for the Organisation of Investigations regarding the Carbonic Acid Factors[1]) in sea water.

The problems to be dealt with in this investigation regarding carbonic acids in sea water are the following:—

1) to state experimentally the mutual relations between the various carbonic acid factors for the purpose of finding a means for calculating all factors by the easiest existing analyses.
2) to investigate the reaction of the carbonic acid factors in the sea itself and their relations to other factors.

For promoting the solution of these problems it is proposed:— to convene an international working committee consisting of two (three) qualified experts who should be charged with the work specified in the programme below.

The committee should meet at Helsingfors.

The necessary means for the instruments required for the outfit of the committee should be provided, as should also the necessary research material, i.e. sea water of the desired salinity and from certain places.

For assistance, a laboratory assistant as well as a clerical staff should be placed at the committee's disposal.

It is calculated that the work will take approximately two months. Owing to the relatively extensive preparatory work and, perhaps, complementary work after the chief work is completed and which does not need the assistance of the whole committee, the mandate of the expert living on the spot is calculated to last three months, and during this time the laboratory assistant and the clerks should be at his disposal.

Programme of the Committee.

1) To accomplish the work mentioned above under § 1. The details regarding the necessary investigations and measurements follow from K. BUCH's paper: "Die Kohlensäurefaktoren des Meerwassers. P.M. Fortsetzung der Untersuchungen" which will appear shortly.

[1]) "All the quantities dependent on and varying with the carbonic acid content of sea-water". KURT BUCH: Die Kohlensäurefaktoren des Meerwassers. Rapp. & Proc.-Verb., in press.

7) Après examen d'une communication de M. D. J. Matthews, dans laquelle l'auteur donne des détails au sujet d'une table dressée par lui pour le calcul rapide de la densité, ainsi qu'une page spécimen en manuscrit, le Comité recommande que les tables soient publiées. Tous les détails nécessaires seront arrangés par correspondance entre M. Matthews et le Service Hydrographique.

Appendice.

Proposition pour l'organisation d'investigations relatives aux facteurs [1]) de l'acide carbonique dans l'eau de mer.

Les problèmes qui doivent être traités dans cette investigation concernant l'acide carbonique dans l'eau de mer sont les suivants:

1) Etablir expérimentalement les relations existantes entre les divers facteurs d'acide carbonique, dans le but de trouver un moyen de calculer tous les facteurs par les analyses les plus faciles.
2) Investiguer la réaction des facteurs de l'acide carbonique dans la Mer elle même et leur relation avec d'autres facteurs.

Pour favoriser la solution de ces problèmes il est proposé de réunir un Comité international de travail comprenant deux (ou trois) experts qualifiés qui seraient chargés du travail spécifié dans le programme ci-dessous.

Le Comité se réunirait à Helsingfors.

Les moyens de travail en fait d'instruments requis pour l'outillage du Comité devraient lui être fournis ainsi que le matériel de recherche, c'est-à-dire l'eau de mer d'une salinité désirée et de certaines provenances.

En fait d'aide, un assistant de laboratoire ainsi qu'un personnel d'employés, devraient être mis à la disposition du Comité.

Il est prévu que le travail prendra à peu près deux mois. A cause du travail préparatoire relativement étendu, et du travail complémentaire qui suivra peut-être l'achèvement du travail principal et qui ne nécessitera pas l'assistance de tout le Comité, il est prévu que le mandat de l'expert habitant la place, durera trois mois. Durant ce temps l'assistant de laboratoire et les employés devront être à sa disposition.

Programme du Comité.

1) Exécution du travail mentionné plus haut, au par. 1. — Les détails concernant les investigations et les mensurations nécessaires, ressortent du mémoire de K. Buch: "Die Kohlensäurefaktoren des Meerwassers. P. M. Fortsetzung der Untersuchungen", qui paraîtra sous peu.

[1]) "Toutes les quantités dépendant de la contenance en acide carbonique et variant avec elle dans l'eau de mer". Kurt Buch: Die Kohlensäurefaktoren des Meerwassers. Rapp. et Proc.-Verb. sous presse.

2) To test the methods to be used for investigating the carbonic acid factors in the sea itself. To work out proposals for the standardisation of methods concerning especially the measurement of p_H and of the alcalinity and to draft the prescriptions required.

3) To work out proposals for the standardisation of denominations.

Copenhagen, May 28th, 1930.

Signed: Schulz. J. Giral. Kurt Buch.

Plankton Committee.

Chairman: Prof. C. H. Ostenfeld.
The Committee met on May 28th, 1930 at 11.00 a. m.

I. Proceedings.

1) Professor Mielck reported that owing to other duties Dr. Künne had not been able to continue his work on comparison of the catching power of the various types of plankton nets, but that he intended to do so in the coming year. He also showed photos of a new type of vertical net. This net, a large net of 2 meter diameter with very coarse silk gauze is intended for the capture of the somewhat larger fishlarvae.

A general discussion on different types of plankton nets followed, in which Prof. Mielck, Dr. Buchanan-Wollaston, Dr. Bowman, Mr. Farran and the Chairman took part.

2) Dr. Jespersen gave a preliminary report on his work on the food of the herring, and on plankton investigations in Icelandic waters.
3) The Chairman gave a report on some of his work with the last part of the "Résumé Planktonique".
4) On the proposal of the Chairman, Mr. le Gall was made a member for France of the Plankton Committee. Dr. Ramalho announced that Portugal would later appoint a member to the Committee.
5) Prof. C. H. Ostenfeld was reelected as Chairman for the ensuing year.

II. Recommendations.

1) That, if time allowed some part of the time of next year's Scientific Meetings be devoted to a discussion of the relation of p_H and CO_2 to the amount of the plankton.
2) That Prof. Mielck shall carry out during the coming year the comparison of the catching power of the various types of plankton-nets not executed last year.
3) That Prof. Ostenfeld's General Summary of the Résumé Planktonique be printed as the last part of the Résumé Planktonique.
4) The Committee further expressed the view that Professor Ostenfeld's services in connection with the production of the Résumé Planktonique and as Chairman of the Plankton Committee should receive some recognition from the Council.

2) Epreuve des méthodes à suivre pour la recherche des facteurs de l'acide carbonique dans la Mer elle même. Elaboration de propositions pour la standardisation des méthodes concernant spécialement la mesure du p_H et de l'alcalinité, et rédaction des prescriptions requises.
3) Elaboration des propositions pour la standardisation des termes.

Copenhague, 28 Mai 1930.

(signé) Schulz. J. Giral. Kurt Buch.

Comité du Plancton.

Président: le Professeur C. H. Ostenfeld.
Le Comité se réunit le 28 Mai 1930 à 11h a.m.

I. Compte rendu.

1) Le Prof. Mielck rapporte que par suite d'autres occupations le Dr. Künne n'a pas pu continuer son travail sur la comparaison du pouvoir capturant de divers types de filet à plancton, mais qu'il se propose de le faire dans le cours de l'année. Il montre aussi des photographies d'un nouveau type de filet vertical. Ce grand filet a 2 mètres de diamètre; il est fait d'une gaze de soie très grossière et est destiné à la capture des larves de poisson d'une taille assez forte.

Une discussion générale au sujet de divers types de filet à plancton suit cette communication. Y prennent part: le Prof. Mielck, le Dr. Buchanan-Wollaston, le Dr. Bowman, M. Farran et le Président.

2) Le Dr. Jespersen donne un aperçu préliminaire sur son travail sur la nourriture du hareng et sur ses recherches planctoniques dans les eaux d'Islande.
3) Le Président fait rapport sur son travail pour la dernière partie du Résumé planctonique.
4) Sur la proposition du Président M. le Gall est adjoint au Comité comme membre pour la France. Le Dr. Ramalho annonce que le Portugal présentera plus tard un membre pour le Comité.
5) Le Prof. Ostenfeld est réélu Président pour l'année suivante.

II. Recommandations.

1) Que si les circonstances le permettent, une partie du temps des Réunions scientifiques de l'année prochaine, soit consacrée à une discussion sur la relation qui existe entre le p_H et le CO_2 et la quantité de plancton.
2) Que le Prof. Mielck poursuive pendant l'année courante la comparaison du pouvoir capturant de divers types de filets à plancton, qui n'a pas été terminée l'année passée.
3) Que le Sommaire général du Résumé Planctonique du Prof. Ostenfeld soit imprimé comme dernière partie du Résumé Planctonique.
4) En outre le Comité exprime le vœu que les services rendus par le Prof. Ostenfeld pour l'élaboration du Résumé Planctonique et pour la Présidence du Comité du Plancton reçoivent quelque rémunération de la part du Conseil.

Statistical Committee.

Chairman: Professor D'Arcy W. Thompson.
The Committee met on May 29th, 1930 at 4 p.m.

Proceedings.

1) The Statistical Bulletins for 1927 and 1928 were presented, the former having been already circulated, the latter being nearly ready for publication.
2) The Chairman laid before the Committee a new table, shewing the quantities of each kind of fish landed by foreign vessels in England and Scotland during the year 1928; and this table was approved by the Committee for inclusion in the Bulletin.
3) The Chairman reported on certain changes introduced into the Bulletin for 1928, the chief of them being in accordance with a resolution passed by the Committee in April 1929, to the effect that all fish landed should be shewn in the tables under the country to which the vessel belonged by which the catch had been made.
4) With reference to the decision recorded in paragraph 2 of the Committee's Report of 1929, a summary table submitted by Mr. T. Edser was adopted, with certain modifications: together with certain proposals which were already in the hands of the Committee.
5) On the proposal of Dr. le Danois, it was agreed to recommend that Greenland should be recognised as a separate fishing-region, in addition to those approved by the Council.
6) Professor D'Arcy W. Thompson was re-elected Chairman for the ensuing year.

Limnological Committee.

Chairman: Prof. H. Henking.
The Committee met on May 28th, at 10 a.m. and on May 30th, at 9.30 a.m.

I. Proceedings.

1) The various members of the Committee gave brief accounts of the work carried out in their respective countries during 1929.
2) Dr. A. C. Johansen communicated a Report on "The Salmon in the River Gudenaa".
3) Mr. Erik M. Poulsen communicated a report on the "Results of marking experiments with young sea trout at Bornholm, and on Racial Investigations on sea trout from Jutland".
4) Mr. W. J. M. Menzies gave an account of the investigations of the Furunculosis Committee in Scotland and England. Mr. R. Southern spoke of the occurrence of the disease in Ireland.
5) The pollution due to the effluents from Sugar Beet Factories was discussed.
6) The effect on fisheries of the pollution caused by the discharge of oil from ships was discussed. Prof. O. de Buen gave an account of the proceedings at the Washington Conference and moved the following proposals:—

Comité Statistique.

Président: le Professeur D'Arcy W. Thompson.
Le Comité se réunit le 29 Mai 1930 à 4h p.m.

I. Compte rendu.

1) Les Bulletins statistiques pour 1927 et 1928 sont présentés: le premier a déjà été distribué, le second est presque prêt pour l'impression.
2) Le Président soumet au Comité un nouveau tableau montrant les quantités de chaque poisson débarquées par des navires étrangers en Angleterre et en Ecosse pendant l'année 1928. Ce tableau est approuvé par le Comité; il sera inclus dans le Bulletin.
3) Le Président signale certains changements introduits dans le Bulletin pour 1928. Le principal d'entre eux a été effectué en conformité avec une résolution prise par le Comité en Avril 1929 et établissant que tout poisson débarqué doit être indiqué dans les tables sous l'indication du Pays auquel appartient le navire par lequel la capture a été faite.
4) Au sujet de la décision inscrite au paragraphe 2 du Rapport du Comité de 1929, un tableau sommaire présenté par M. T. Edser est adopté avec certaines modifications, ainsi qu'avec certaines propositions qui étaient déjà aux mains du Comité.
5) Sur la proposition de Dr. le Danois, il est décidé de recommander que le Groenland soit reconnu comme région de pêche distincte, à ajouter à celles qui sont admises par le Conseil.
6) Le Professeur D'Arcy W. Thompson est réélu Président pour l'année suivante.

Comité Limnologique.

Président: le Professeur H. Henking.
Le Comité se réunit le 28 Mai à 10h a.m. et le 30 Mai à 9h30 a.m.

I. Compte rendu.

1) Divers membres du Comité donnent un court aperçu du travail exécuté dans leurs pays respectifs en 1929.
2) Le Dr. A. C. Johansen présente un rapport sur "Le Saumon dans la rivière Gudenaa".
3) M. Erik M. Poulsen présente un rapport sur "Les résultats d'expériences de marquage sur la jeune truite de mer à Bornholm et sur des investigations raciques sur la truite de mer du Jutland".
4) M. W. J. M. Menzies fait rapport sur les investigations du Comité de la Furonculose en Ecosse et en Angleterre. M. Southern parle de l'occurrence de cette maladie en Irlande.
5) La pollution due aux vidanges des fabriques de sucre de betterave est discutée.
6) L'effet sur la pêcherie de la pollution causée par la décharge d'huile des navires est discuté. Le Prof. O. de Buen donne un compte rendu de la Conférence de Washington et présente les propositions suivantes:

a) To recommend to the Delegates of the different Countries that investigations be carried out at the coast laboratories, by every means available at the fisheries offices, on a strictly scientific basis, and that the results of these investigations and of all information be collected in order to determine to what extent the pollution of the sea by petrol and heavy oils is injurious to fish life.

b) That the results of these investigations and of the information be submitted to the Council for the consideration of a specially appointed Committee and for publication.

Prof. HENKING proposed that each member should collect evidence bearing on this matter in his own country and submit it to the next meeting of the Committee.

7) Prof. HENKING gave a summary of the information received from the various countries regarding laws for the protection of Salmonidae. The information is still incomplete.

8) A discussion took place on the significant letters allotted to each country to distinguish the labels used for marking salmon and sea trout.

9) Prof. HENKING demonstrated some material of Salmonidae, details of which will be given in the second part of his Report on: "Untersuchungen an Salmoniden".

10) A discussion took place on the desirability of investigating the racial characteristics of salmon and sea-trout in various countries. Mr. W. J. M. MENZIES commented on the difficulty of interpreting correctly the scales of sea-trout and moved a proposal (given below, II, 5). The proposal was seconded by Dr. A. C. JOHANSEN.

11) Prof. HENKING was reelected as Chairman for the ensuing year.

II. Recommendations.

1) That Part II of Prof. HENKING's Report dealing with Salmon and Sea Trout should be published.

2) That the Sub-committee appointed for the study of the Salmon in the area between Great Britain, Ireland, France and Spain be asked to continue its work. Prof. ROULE was reelected as Chairman of the Sub-committee.

3) That the programme for the ensuing year be the same as that adopted in 1928 and 1929.

4) On the proposal of Mr. R. SOUTHERN that in future years each member should give an account of the catch of Salmon and Sea Trout in his country, together with such statistics of catch as are available.

5) That a representative of each participating country should prepare a review of the reading of sea-trout scales of their respective countries. The reviews are to be directed towards correlating the variations of the scale zones with the life-history and growth calculations. The results should, if possible, be completed in time for circulation before the next meeting when photographs or diagrams of scales are to be brought for illustration of the papers and for discussion.

a) Recommander aux délégués des divers Pays que dans les laboratoires littoraux et par les moyens dont disposent les Services des pêches, soient effectuées des expériences en suivant une rigoureuse méthode scientifique et que les résultats de ces expériences et tous renseignements soient groupés afin de préciser l'étendue des dangers que peut avoir pour la faune marine la pollution des eaux par le pétrole et les huiles lourdes.

b) que les résultats de ces expériences et ces renseignements pris soient transmis au Conseil pour qu'une Commission spécialement constituée les étudie et les publie.

Le Prof. HENKING propose que chacun des membres réunisse des informations sur la matière dans son pays et les soumette à la prochaine réunion du Comité.

7) Le Prof. HENKING résume les informations reçues des divers Pays au sujet des lois pour la protection des Salmonides. Ces informations sont encore incomplètes.

8) Une discussion a lieu au sujet des lettres assignées à chacun des Pays pour distinguer les marques employées pour le saumon et la truite.

9) Le Prof. HENKING expose certains matériaux relatifs aux Salmonides, les détails de sa démonstration seront donnés dans la seconde partie de son rapport: "Untersuchungen an Salmoniden".

10) Une discussion a lieu au sujet de l'investigation désirable des caractères raciques du saumon et de la truite de mer dans diverses régions. M. W. J. M. MENZIES commente les difficultés de l'interprétation directe des écailles de la truite de mer et formule une proposition (donnée plus bas, II, 5). Cette proposition est appuyée par le Dr. A. C. JOHANSEN.

11) Le Prof. HENKING est réélu Président pour l'année suivante.

II. Recommandations.

1) Que la Partie II du Rapport du Prof. HENKING traitant du saumon et de la truite de mer, soit publié.

2) Que le Sous-Comité nommé pour l'étude du saumon dans l'aire comprise entre la Grande Bretagne, l'Irlande, la France et l'Espagne soit prié de continuer son travail. Le Prof. ROULE est réélu Président de ce Sous-Comité.

3) Que le programme pour l'année suivante soit le même que celui qui a été adopté pour 1928 et pour 1929.

4) Sur la proposition de M. SOUTHERN, que dans les années à venir chaque membre rende compte de la capture du saumon et de la truite de mer dans son pays, avec les données statistiques, qu'il est possible d'obtenir au sujet de cette capture.

5) Qu'un représentant de chacun des Pays participants prépare une révision des lectures d'écailles de la truite de mer dans son Pays. Ces révisions doivent tendre à découvrir une corrélation entre les variations des zones de l'écaille et les phases de la biologie de ce poisson en vue du calcul de la croissance. Les résultats, si c'est possible, devraient être assez complets en temps voulu pour permettre ce calcul avant la réunion prochaine. A cette réunion il faudrait apporter des photographies et des diagrammes d'écailles pour servir à la discussion et à la démonstration.

Editorial Committee.

Chairman: Prof. O. Pettersson.
The Committee met on May, 30th at 2.30 p. m.

I. Proceedings.

1) The Chairman laid the Report regarding the publications issued and the cost of same during the financial year 1929/30 before the Committee. No remarks were offered on this report.
2) The Committee then dealt with the following papers announced for printing in the year 1930/31.
   a) Prof. Ostenfeld's Plankton Résumé. Prof. Ostenfeld informed the members that this paper, the printing of which had been decided upon last year was not yet finished. He had, however, received a preliminary estimate from the printing office of about 1600.00 Kr. for printing the Résumé in the format of the Bulletin Planktonique, and he emphasized the necessity of keeping to this format, to secure uniformity among the parts of the Résumés Planktoniques.
   b) Report of the North Western Area. A letter from Dr. Tåning was distributed together with an estimate of the cost of this publication. The chairman pointed out that the printing of this report was recommended by the North Western Area Committee. The report would be larger than is consistent with the rules laid down last year for the Council's publications. Dr. le Danois thought that as the Committee published a report only every second year they were entitled to publish a larger report. He further pointed out that there had been question of including in this paper a reprint of a paper by Commandant Beaugé formerly published in Rev. des Travaux de l'Office des Pêches Maritimes, Vol. II, No. 4; if this was decided upon he would be pleased to place blocks at the disposal of the Council in order to save money, but he did not lay any stress on having this paper reprinted. Prof. Ehrenbaum suggested that a note should be given in the North Western Area Report referring to the paper by Commandant Beaugé.

   c) Report of the Transition Area Committee concerning Plaice-Investigations in the Kattegat and Skagerak. This Report was recommended for printing by the Transition Area Committee. It would contain 114 pages and cost Kr. 2,520.
   d) The paper by Hessle and Vallin the printing of which had been agreed last year. The Chairman stated that this paper had been sent to the Office too late for printing during the financial year 1929/30, but was too long to permit of its publication according to the rules of the Council. Captain Schøning had therefore applied to him. He had according to rule No. 3 of the Editorial Committee of last year sought the advice of Prof. Gran and Dr. Jespersen who had both declared that the paper was of a great scientific value. Now Dr. Andersson had applied to the Chairman of the Consultative Committee who had brought forward in the Bureau the proposal that the Bureau should pay Kr. 6,000.00, Dr. Andersson

Comité Editorial.

Président: le Professeur O. Pettersson.
Le Comité se réunit le 30 Mai à 2h30 p.m.

I. Compte rendu.

1) Le Président dépose devant le Comité le rapport relatif aux publications faites et à leur coût pendant l'année financière 1929—30. Aucune remarque n'est faite au sujet de ce rapport.

2) Le Comité s'occupe ensuite des travaux suivants annoncés pour l'impression en 1930—31.

a) Résumé Planctonique du Prof. Ostenfeld. Le Prof. Ostenfeld fait connaître aux membres que son travail dont l'impression a été décidée l'an dernier, n'est pas encore terminé. Il a cependant reçu du bureau de l'imprimerie une estimation préliminaire d'environ 1600,00 C. pour l'impression du Résumé dans le format du Bulletin Planctonique. Il insiste sur la nécessité de garder ce format pour assurer l'uniformité de toutes les parties des Résumés Planctoniques.

b) Rapport du Secteur Nord-Ouest. Une lettre du Dr. Tåning est distribuée, en même temps qu'une estimation du coût de cette publication. Le Président fait remarquer que l'impression de ce rapport a été recommandée par le Comité du Secteur Nord-Ouest. Le rapport dépasserait la dimension admise par les règles émises l'année passée pour les publications du Conseil. Le Dr. le Danois pense que puisque le Comité ne publie un rapport que tous les deux ans, il est en droit d'en publier un plus important. Il faut remarquer aussi qu'il a été question d'inclure dans ce travail une réimpression d'un mémoire du commandant Beaugé, publié précédemment dans la Revue des Travaux de l'Office des Pêches Maritimes, Vol. II, No. 4. Si cela était décidé il se ferait un plaisir de mettre les clichés à la disposition du Conseil pour réaliser une économie, mais il n'insiste pas pour que ce mémoire soit réimprimé. Le Prof. Ehrenbaum émet l'idée qu'une note pourrait être insérée dans le Rapport du Secteur Nord-Ouest au sujet du travail du Commandant Beaugé.

c) Rapport du Comité du Secteur de Transition au sujet des investigations sur la plie dans le Cattégat et le Skagerak. Ce rapport a été recommandé pour l'impression par le Comité du Secteur de Transition. Il comprendrait 114 pages et coûterait 2.520 C.

d) Travail de Hessle et Vallin dont l'impression a été décidée l'an dernier. Le Président constate que ce travail a été envoyé à l'Office, trop tard pour être imprimé pendant l'année financière 1929—30. Mais ce travail est trop long pour pouvoir être publié dans les règles établies du Conseil. Le Cap. Schöning a donc communiqué avec lui. Conformément à la règle no. 3 du Comité Editorial de l'an dernier, il a pris l'avis du Prof. Gran et du Dr. Jespersen, qui tous deux ont déclaré que le travail est d'une grande valeur scientifique. Le Dr. Andersson s'est donc adressé au Président du Comité Consultatif qui a présenté au Bureau la proposition de payer 6000,00 C. — le Dr. Andersson et la Commission Sué-

and the Swedish Commission being responsible for the translation and any amount over 6000 Kr. Prof. D'Arcy Thompson and Prof. Siedlecki were of the opinion that the paper ought to be printed either in English or German. Dr. le Danois, Dr. Russell, Prof. Ehrenbaum and Prof. Knudsen did not think this paper fell into the category of papers which ought to be published by the Council, but considered that it should be published by the Swedish Commission.

e) Dr. le Danois stated that the Rapport Atlantique for 1929 would not exceed 100 pages.

3) A circular from Prof. Magrini, Editor of the General Bibliography of the Science of the Sea, asking for short abstracts of papers published by the Council was discussed. Prof. Knudsen suggested that the wish should be expressed that authors should prepare such abstracts. Prof. de Buen suggested that the national delegations should take the responsibility for the sending in of such abstracts, but Dr. le Danois thought it would be much too difficult, in the cases, as examples, of the British, French and German delegations. Prof. Joubin informed the members as to his experiences as editor, although asking for résumés he hardly ever received any. Prof. D'Arcy Thompson informed the members that the Royal Society in London did not publish any paper of which an abstract was not received. The adoption of this manner of proceeding was discussed.

4) The Chairman informed the members that a good deal of money might be saved by sending the Council's publications to certain countries through the Academy of Sciences and Letters of Denmark.

II. Recommendations.

1) The printing of the following reports was recommended:—
Résumé Planktonique.
Report of the North Western Area.
Report of the Transition Area Committee.

2) The Committee is of the opinion that the report by Messrs Hessle and Vallin is a valuable one and should, if possible, be published at the cost of the Swedish Authorities; and requests the Chairman to undertake negotiations to this end. The Chairman abstained from voting.

3) It was decided to recommend to the Council that authors should be requested to send in with their papers short abstracts for the use of Prof. Magrini in the General Bibliography of the Science of the Sea.

4) It was decided that the expedition of publications to the U.S.A. should take place through the intermediary of the Academy of Sciences and Letters of Denmark.

5) It is recommended that there should be published by the Council a sheet or pamphlet giving illustrations of all the fish marks at present in use in the participant countries, both for marine and for fresh water fish.

6) It was decided to add the following words to point 7 in the rules governing the Council's publications (see Pr.-Verb. Vol. LX, p. 58):— Printing not to be commenced before the manuscript is delivered in full and complete form.

doise étant responsable de la traduction et de tout excédent au dessus de 6000 C. Le Prof. D'Arcy Thompson et le Prof. Siedlecki sont d'avis que ce travail devrait être publié soit en Anglais soit en Allemand. Le Dr. le Danois, le Dr. Russell, le Prof. Ehrenbaum et le Prof. Knudsen ne sont pas d'avis que ce mémoire tombe dans la catégorie des travaux qui doivent être publiés par le Conseil mais pensent qu'il devrait l'être par la Commission Suédoise.

e) Le Dr. le Danois déclare que le Rapport Atlantique pour 1929 ne dépassera pas 100 pages.

3) Une circulaire du Prof. Magrini, Rédacteur de la "Bibliographie Générale des Sciences de la Mer", demandant des résumés des travaux publiés par le Conseil est discutée. Le Prof. Knudsen suggère l'idée de demander aux auteurs de préparer eux mêmes ces extraits. Le Prof. de Buen propose que les Délégations nationales assument la responsabilité de l'envoi de ces extraits, mais le Dr. le Danois pense que cela serait beaucoup trop difficile dans le cas de la Délégation Britannique, Française ou Allemande, par exemple. Le Prof. Joubin fait part aux membres de son expérience d'éditeur: quoi qu'ayant sollicité des résumés des auteurs, c'est à peine s'il en a reçu. Le Prof. D'Arcy Thompson fait connaître que la Société Royale de Londres ne publie aucun travail dont elle n'a pas reçu un résumé. L'adoption de cette procédure fait l'objet d'une discussion.

4) Le Président fait remarquer aux membres qu'une sérieuse économie pourrait être réalisée par l'envoi des publications du Conseil par l'intermédiaire de l'Académie des Sciences et des Lettres de Danemark.

II. Recommandations.

1) L'impression des mémoires suivants est recommandée:

Résumé Planctonique.

Rapport du Secteur Nord-Ouest.

Rapport du Comité du Secteur de Transition.

2) Le Comité est d'avis que le rapport de Mr. Hessle et Vallin est un travail de valeur et qu'il devrait être publié, si possible, aux frais des Autorités Suédoises. Il charge le Président d'entreprendre des négociations à cette fin. Le Président s'abstient de voter.

3) Il est décidé de recommander au Conseil que les auteurs soient priés de joindre à leurs mémoires un extrait résumé pour l'emploi du Prof. Magrini dans la Bibliographie Générale des Sciences de la Mer.

4) Il est décidé que l'envoi des publications aux Etats-Unis d'Amérique se fera par l'intermédiaire de l'Académie des Sciences et des Lettres de Danemark.

5) Il est recommandé qu'il soit publié par le Conseil une circulaire ou une brochure figurant toutes les marques à poissons employées aujourd'hui par les Pays participants, tant pour les poissons marins que pour les poissons d'eau douce.

6) Il est décidé d'ajouter les mots suivants au point no. 7 des règles concernant les publications du Conseil (voir Pr.-Verb. Vol. LX, p. 59): L'impression ne doit pas être commencée avant que le manuscrit soit présenté au complet et dans sa forme définitive.

Whaling Committee.

Chairman: Prof. JOHAN HJORT.
The Committee met on May 28th, 1930 at 10.00 a. m.

I. Proceedings.

1) The Chairman informed the Committee that the statistics collected by the International Office for Whaling Statistics[1]) will be circulated shortly.
2) Mr. RUFFAT expressed his satisfaction at the provisions of the Norwegian Whaling Act and stated that they corresponded closely with the regulations enforced by the French Colonial Administration and were in accordance with the views of French Scientists.
3) Prof. HJORT was reelected as Chairman of the Committee.

II. Recommendation.

On the motion of the Chairman it was agreed to postpone the discussion of the Whaling situation until next year, when the proceedings of the conference recently held at Berlin by the Economic Committee of the League of Nations will be available for consideration as also will be the statistics referred to under I, 1, above.

[1]) See Rapp. & Proc.-Verb. Vol. LX, p. 64.

Comité de la Baleine.

Président: le Prof. Johan Hjort.
Le Comité se réunit le 28 Mai, 1930 à 10h a.m.

I. Compte rendu.

1) Le Président fait connaître au Comité que les statistiques réunies par l'Office International pour la Statistique de la Baleine[1]) seront bientôt distribuées.
2) M. Ruffat exprime sa satisfaction au sujet des mesures comprises dans le "Norwegian Whaling Act" et déclare qu'elles correspondent exactement aux règlements mis en vigueur par l'administration Coloniale Française et sont d'accord avec les vues des hommes de science Français.
3) Le Professeur Hjort est réélu Président du Comité.

II. Recommandation.

Sur la proposition du Président, il est décidé de remettre la discussion de la situation de la pêche de la Baleine à l'année prochaine, après la publication des comptes-rendus de la Conférence du Comité Economique de la Société des Nations qui s'est tenue récemment à Berlin, alors que l'on pourra disposer à la fois de ces comptes rendus et des statistiques mentionnées ci-dessus au no. 1.

[1]) Voir Rapp. & Proc.-Verb., Vol. LX, p. 65.

Reports of Scientific Meetings.

Biological Scientific Meeting.

Chairman: Dr. E. S. Russell.
The Meeting was held on May 27th, 1930, at 10.00 a. m.

I. Proceedings.

After introductory remarks by the Chairman the reporters appointed to review the papers which were contributed last year on the various fish opened the discussion by reading papers which were in each case followed by a discussion.

The reporters and participants were as follows:—

Cod. Reporter: Mr. Michael Graham. Report: Notes for Discussion of the Fluctuations in Abundance of Year-classes of Cod (*Gadus callarias* L.) in European Waters. Participants in the discussion: Mr. O. Sund, Mr. E. M. Poulsen, Prof. Hjort.

Haddock. Reporter: Dr. Harold Thompson. Report: On the Possibility of effecting and utilising accurate Estimates of Haddock Fluctuations. Participants in the discussion: Prof. J. Hjort, Prof. E. Ehrenbaum, Dr. A. Bowman.

Plaice. Reporter: Dr. A. Bückmann. Report: Die Erforschung der Fluktuationserscheinungen bei der Scholle (*Pleuronectes platessa* L.). Participants in the discussion: Prof. Mielck, Dr. J. N. Carruthers, Prof. van Everdingen, Mr. H. J. B. Wollaston, Dr. J. J. Tesch.

Herring. Reporter: Mr. Einar Lea. Report: Fluctuations in the Stock of Fish — Herring. Participants in the discussion: Prof. W. Mielck, Prof. J. Hjort, Prof. E. Ehrenbaum, Dr. K. A. Andersson, Dr. J. J. Tesch.

Sprat. Reporter: Mr. Paul Bjerkan. Report: Methods of Investigation into the Fluctuations in Sprat Stocks. Participant in the discussion: Dr. E. S. Russell.

Sardine. Reporter: M. Jean le Gall. Report: Rapport sur la Sardine. Participants in the discussion: Dr. Ed. le Danois, Prof. Odón de Buen.

II. Recommendation.

That the various Area Committees be consulted in regard to the choice of subject for the next Biological Scientific Meeting.

Rapports des Réunions Scientifiques.

Réunion Scientifique Biologique.

Président: le Dr. E. S. Russell.
Le Comité se réunit le 27 Mai 1930 à 10h a.m.

I. Compte rendu.

Après quelques remarques introductives du Président, les Rapporteurs nommés pour faire la révision des travaux présentés l'an dernier sur les divers poissons, lisent des communications qui sont toutes suivies d'une discussion.

Les Rapporteurs et participants sont les suivants:

Cabillaud. Rapporteur: M. Michel Graham. — Rapport: Notes pour la discussion sur les fluctuations de l'abondance des classes annuelles du Cabillaud (*Gadus callarias* L.) dans les eaux Européennes. Participants dans la discussion: M. O. Sund, M. E. M. Poulsen, le Prof. Hjort.

Aiglefin. Rapporteur: le Dr. Harold Thompson. — Rapport: Sur la possibilité de dresser et d'employer une estimation exacte des fluctuations de l'Aiglefin. Participants dans la discussion: le Prof. J. Hjort, le Prof. E. Ehrenbaum, le Dr. A. Bowman.

Plie. Rapporteur: le Dr. A. Bückmann. — Rapport: La recherche des phénomènes de Fluctuations de la plie (*Pleuronectes platessa* L.). Participants dans la discussion: le Prof. Mielck, le Dr. J. N. Carruthers, le Prof. van Everdingen, M. H. J. B. Wollaston, le Dr. J. J. Tesch.

Hareng. Rapporteur: M. Einar Lea. — Rapport: Fluctuations dans le stock des poissons — Harengs. Participants dans la discussion: le Prof. W. Mielck, le Prof. J. Hjort, le Prof. E. Ehrenbaum, le Dr. K. A. Andersson, le Dr. J. J. Tesch.

Esprot. Rapporteur: M. Paul Bjerkan. — Rapport: Méthodes d'investigation sur les fluctuations des Stocks d'Esprot. Participant dans la discussion: le Dr. E. S. Russell.

Sardine. Rapporteur: Mr. Jean le Gall. — Rapport: Rapport sur la Sardine. Participants dans la discussion: le Dr. Ed. le Danois, le Prof. Odón de Buen.

II. Recommandation.

Que les divers Comités des Secteurs soient consultés au sujet du choix du sujet pour la prochaine Réunion Scientifique Biologique.

Hydrographic Scientific Meeting.

Chairman: Professor Rolf Witting.
The Meeting was held on May 27th, 1930, at 2.30 p. m.

I. Proceedings.

1) Reports on current measurements.
   a) Admiral H. P. Douglas: Current Measurements in the Strait of Gibraltar made in H.M.S. Goldfinch in 1905.
   b) Dr. Alfredo Ramalho: Quelques aspects des phénomènes de mélange d'eaux méditerranéennes et atlantiques dans le Golfe de Gibraltar.
   c) Mr. D. J. Matthews: The Influence of tidal movements on the thermal layers in the approaches to the English and Irish Channels.

   In the following discussion took part: Prof. Rafael de Buen, Prof. Defant, Prof. Martin Knudsen.

2) Reports on the mixing-phenomena in the Sea.
   a) Dr. J. P. Jacobsen: The mixing of water masses in the sea.
   b) Prof. A. Defant: Über die Natur der Mischung im Meere.

   In the following discussion took part: Prof. R. Witting and Prof. E. van Everdingen.

3) Report on the Carbonic Acid and p_H.
   a) Dr. Kurt Buch: Die Kohlensäurefaktoren des Meerwassers.
   b) Dr. R. Kändler: Beiträge zur Kenntnis über die Beziehungen zwischen Wasserstoffionen Konzentration, freier Kohlensäure und Alkalinität im Meerwasser. (Read by Prof. B. Schulz.)
   c) Prof. B. Schulz: Die Alkalinität des Oberflächenwassers der Nordsee und des Nordatlantik.

   Discussion: Prof. J. Giral.

4) Dr. Rehberg: Demonstration of Krogh-Rehberg's apparatus for determination of carbonic-acid-tension.

II. Recommendations

1) That the reports read and the discussions should be printed
2) That decision as to the subject to be discussed at next years Scientific Hydrographic Meeting be left to the Hydrographic Committee.

Réunion Scientifique Hydrographique.

Président: le Professeur Rolf Witting.
Le Comité se réunit le 27 Mai 1930 à 2h30 p.m.

I. Compte rendu.

1) Rapports sur les mesures de courants.
   a) L'amiral H. P. Douglas: Mesures de courants dans le Détroit de Gibraltar, exécutées par H.M.S. "Goldfinch", en 1905.
   b) Le Dr. Alfred Ramalho: Quelques aspects des phénomènes de mélange d'eaux méditerranéennes et atlantiques dans le Golfe de Gibraltar.
   c) M. D. J. Matthews: L'influence des mouvements de marée sur les couches thermiques aux approches de la Manche et du Canal d'Irlande.

   Prennent part à la discussion subséquente: Le Prof. Rafael de Buen, le Prof. Defant, le Prof. Martin Knudsen.

2) Rapports sur les phénomènes de mélange dans la Mer.
   a) Le Dr. J. P. Jacobsen: Le Mélange des Masses d'eau dans la Mer.
   b) Le Prof. A. Defant: Sur la Nature du Mélange en Mer.

   Prennent part à la discussion subséquente, le Prof. R. Witting, le Prof. van Everdingen.

3) Rapport sur l'Acide carbonique et le p_H.
   a) Le Dr. Kurt Buch: Les Facteurs de l'acide carbonique de l'eau de Mer.
   b) Le Dr. R. Kändler: Contributions à la connaissance des Relations entre la concentration des Ions d'Hydrogène, l'Acide Carbonique libre et l'Alcalinité dans l'eau de Mer. (Lu par le Prof. B. Schulz.)
   c) Le Prof. B. Schulz: L'Alcalinité de l'eau de surface de la Mer du Nord et de l'Atlantique Nord.

   Discussion: Le Professeur J. Giral.

4) Le Dr. Rehberg: Démonstration de l'appareil Krogh-Rehberg, pour la détermination de la tension de l'acide carbonique.

II. Recommandations.

1) Que les rapports lus, ainsi que les discussions, soient publiés.
2) Que le choix du sujet à discuter l'année prochaine dans la Réunion scientifique Hydrographique, soit laissé au Comité Hydrographique.

REPORT

of

ADMINISTRATION 1929—1930.

I. General.

Composition of the International Council for the Exploration of the Sea.

During the year 1929—30 no changes have occurred in the composition of the International Council.

Composition of the Bureau.

The members of the Bureau were the same as in the preceding year:— Mr. H. G. Maurice, President, Professor Johan Hjort, Professor Otto Pettersson, M. Théodore Tissier and Dr. C. Heinrici, Vice-Presidents.

Committees.

A list of the Committees will be found in the Procès-Verbaux of the last Council Meeting. All these Committees remain in being and continue their activities.

Audit of Accounts.

The Accounts of the Council for 1928—29, audited by a qualified accountant and examined and found correct by the Finance Committee, will be submitted to the Council for final approval.

A statement is given below of the Accounts for 1929—30 which have to be examined by the Finance Committee.

Statement of Accounts for the financial year 1929—1930.

Receipts:

			Estimates	Real Receipts
I.	1.	Balance brought forward from 1928—29	176 103.75	176 103.75[1])
II.	2.	Annual contributions of the Governments:		
		for 1928—29	172 000.00	82 000.00
		- 1929—30		115 000.00
III.	3.	Interests on Bank deposit	4 000.00	4 053.38
IV.	4.	— - Treasury bonds	3 500.00	3 500.00
V.	5.	Sale of publications	1 000.00	3 007.00
		Total Kr.	356 603.75	383 664.13

Expenditure:

		Ordinary Expenditure:—	Estimates	Real Expenditure
I.	1—5.	Incidental expenses	17 000.00	16 750.00
II.	6—10.	Administrative Staff	40 700.00	40 650.00
III.	11.	Expenses of the office in Copenhagen	15 000.00	14 817.93
IV.	12.	Travelling expenses	15 000.00	11 766.41
V.	13.	Chairmen of Committees	29 000.00	29 000.00
VI.	14.	Printing and distribution	53 500.00	49 941.18
VII.	15.	Transferred to Pension Fund	3 500.00	3 500.00
		Extraordinary Expenditure:—		
VIII.	16.	Special Resolutions of the Council:		
		Mrs. Drechsel's pension	6 500.00	6 500.00
		Tidal Institute	4 107.00	1 819.50
		Investigations of Plankton Nets	1 661.00	831.00
		Hydrographic Charts	600.00	600.00
		Prof. Joubin's illustrations of Atlantic Fauna	4 000.00	5 399.75
		Assistance for determination of Salinity Normals	2 000.00	2 000.00
		Prof. Henking's Report	3 000.00	3 000.00
		Experiments with Fishing Gear	3 000.00	2 742.50
		Prof. Gilson's work	2 500.00	2 500.00
		Binding of books	800.00	799.50
		Total Kr.	201 868.00	192 617.77

Receipts	per 31/3 1930	Kr. 383 664.13
Expenditure	per 31/3 1930	- 192 617.77
Cash balance	per 31/3 1930	**Kr. 191 046.36**

[1]) + Russia's contribution for 1914/15, **Rbl. 14 430.54,** deposited in a Leningrad bank has not yet been recovered.

Of this Balance there were deposited in Kjøbenhavns Handelsbank and cash	Kr. 122 928.31
Danish Treasury Bonds, nominal Kr. 70 000.00, deposited with the Ministry for Finances (Market value on March 31st, Kr. 70 175.00) Purchase value	- 68 118.05
	Kr. 191 046.36

All Contributions for 1928—29 have been received. The following countries have not yet paid their Contributions for 1929—30: Great Britain, Finland, Italy, the Netherlands and Latvia.

Special reserve for pensions:

Danish Treasury Bonds, nominal Kr. 15 000.00, deposited in a box in the bank (Market value on March 31st 1930, Kr. 15 062.50). Purchase value	Kr. 14 707.30
Deposited in Kjøbenhavns Handelsbank	- 269.86
	Kr. 14 977.16

Meetings.

Meetings of the Bureau were held in London in April and in Paris in October 1929. There were present in London all members of the Bureau and in Paris Mr. Maurice, President, and Vice-Presidents Tissier and Heinrici.

II. Work of the Bureau at Copenhagen.

Besides administrative work, correspondence, etc. the following work has been carried out:—

A. Publications.

Report regarding the publications issued and cost of same during the financial year 1929—30 per $^{31}/_{3}$ 1930.

Series	Volume and Subject	Author	No. of copies	Cost Kr.	Remarks
Rapports et Procès-Verbaux	LVI. Whales and Plankton in the North Atlantic		800	6 106.92	For earlier expenses see Pr.-Verb. Vol. XLIX p. 119 & LX p. 75
—	LVII. North Western Area Report		800	6 056.75	
—	LVIII. Table des Matières de Vol. I-LV et Liste des Publ. de Circonstance		800	1 141.50	
		To carry forward...		13 305.17	

Series	Volume and Subject	Author	No. of copies	Cost Kr.	Remarks
		Brought forward ..		13 305.17	
Rapports et Procès-Verbaux	LIX. Vergleich der Fangfähigkeit verschiedener Modelle von Plankton-Netzen	Cl. Künne	800	[831.00]	paid by an unexpended vote from last year under Special Resolutions
—	LX. Procès-Verbaux		800	2 871.50	
—	LXI. Untersuchungen an Salmoniden	H. Henking	800	3 368.75	
—	LXII. Rapport Atlantique		800	2 128.50	
—	LXIII. Die Reichsstatistik über das Fangergebnis der Deutschen Seefischerei	E. Eichelbaum	800	1 299.00	
—	LXIV. Current measurements, direct and indirect		800	1 523.25	
—	LXV. Fluctuations in the abundance of the various year-classes of food-fishes		800	4 202.25	
Bulletins	Bull. Hydrographique 1928		800	5 149.00	
—	Offprints of Bull. Hydr. for 1929, March & April		50	481.00	
—	Offprints, May & June		50	305,75	
—	Offprints, July		50	145,25	
—	Offprints, August		50	34,25	
—	Offprints, September		50	62,75	
—	Offprints, October		50	43,00	
—	Offprints, November		50	125,50	
—	Offprints, December		50	121,25	
—	Offprints, January 1930		50	55.50	
—	Offprints, February 1930		50	74.00	
—	Statistique		800	1 676.80	
Journal du Conseil	Vol. IV, No. 2		750	2 656.35	Cost includes fees to contributors, translations, blocks etc.
	Vol. IV, No. 3		750	2 207.45	
	Vol. V, No. 1		750	2 778.95	
			Total...	44 615.22	

Other costs of Publications:—

Distribution	4 172.43
Translations, drawings etc.....	1 153.53
Grand Total...	49 941.18

B. Hydrographic Department.

The work on which the Service Hydrographique was engaged in the past year was:

1) Preparation of the manuscript and proof-prints of the Bulletin Hydrographique 1929.

Material received before the 10th of any month was usually printed as proof-prints and sent out about the last day of the same month. In the case of some of the material e. g. the material from the lightships, the observations were retained for three months before being sent out, and no proof-prints of the observations of sea-level were sent out. This system was adopted to reduce the cost of the proofs.

Most of the material for the Bulletin 1929 has now (April 1930) been received, and it is very probable that the Bulletin for 1929 will be about the same size as that for 1928.

2) Preparation of lists of observations for decades and squares in the North Sea and calculations of salinity normals.

The whole material from 1902—28 has been registered in lists and means for the decades have been calculated. It is considered however that the decade means could best be combined with monthly means, and could then be used for the construction of charts showing the means of the salinities for every month. The construction of such charts is in progress, but the work will, most probably, take about a year more to complete.

3) For the waters at Faroe — Shetland — Norway a provisional analysis of the different sorts of water was made by means of T S-diagrams.

Very nearly half of the material on hand from 1902—1928 was registered in lists and was partly worked up into diagrams. For this material the analysis has shown that it would perhaps be of value to have the whole material worked up according to the scheme employed.

4) The question as to the construction of charts of normal temperatures for decades in the North Sea according to a proposal of Mr. Lumby was considered.

5) The Service Hydrographique assisted in the publication of the Rapport Atlantique 1928.

C. Statistical Department.

The Bulletin Statistique for the year 1927 was published in August 1929 and the work with the Statistics for 1928 has been carried on during the year 1929—30 and is now so far finished that it is expected to be published in July this year.

Reports of Area Committees.

NORTH-EASTERN AREA
1929.

By

Oscar Sund (Vice-Chairman).

Norway.

Cruises.

The Directorate of Fisheries carried on investigations at sea by means of four vessels, the fishery research cutter "Johan Hjort" and three hired vessels, (the s.s. "Sotra" and m.c. "Hisø" in arctic waters, the "Johan Hjort" along the whole extent of the Norwegian coast and the m. c. "Havdrøn" on the West coast Stavanger-Nordfjord).

The "Johan Hjort" began operations on Feb. 12th with a fortnights cruise in the skjærgaard waters between Bergen and Haugesund making oceanographical studies under the direction of Mr. E. Lea in connection with the incipient spring herring fishery.

On the 27th of Feb. she sailed from Bergen for the north as far as Lofoten, with general plankton and oceanographic investigations as an object. Most of the time until the end of April was spent in the Lofoten area which at that time is the scene of the most important cod fishery. Besides the plankton and oceanographic work the chemical investigation of the oxygen, phosphate and nitrate contents of the water at all depths was continued and made a comparison with the December conditions and those of the preceding spring possible. While the upper layers in December were nearly exhausted as to the latter two substances, a great increase was noticed during March, followed during the first week of April by a rapid decrease, the activity of the plankton algæ being evidenced by increase of oxygen values. There was a very noteworthy difference in the conditions as to nitrates and phosphates in the upper layers between the springs of 1928 and 1929 in the Lofot area: in the former year these layers were better stocked

with nitrate than with phosphate, in 1929 the opposite was the case. From SCHREIBER's find of a similar difference in the German Bight between spring and autumn one might have surmised such a difference as being of a seasonal nature. The conditions at Lofoten the two last years show that the difference does not follow such a rule. During the spring further studies regarding the properties of cod eggs in relation to shock and pressure were made.

On the return voyage to Bergen at the beginning of May observations were repeated on selected spots along the coast.

In May a short cruise was made in the Hardanger fjord and along the neighbouring coast in connection with investigations on the biology of the sprat.

During June and July the "Johan Hjort" was employed in the Finmark waters with a number of sections into the nearest parts of the Barents Sea. It was found that the water masses along the coast contained a greater admixture of Atlantic water than in 1927 while approximately of the same temperatures at the depth as in 1928. In the last two years the cod fishing along the Finmark coast was decidedly inferior to that of 1927 when the water along the coast was colder.

After a lay-up during the remaining part of the summer, the "Johan Hjort" was employed on the coast between Bergen and Stavanger and the adjoining fjords in connection with investigations on the sprat.

From the middle of November until the middle of December the oceanographical conditions, including determination of nitrates etc. along the coast from Finmark to Bergen were investigated. Very high temperatures prevailed in the upper waterlayers along the whole coast, generally 1 degree or more than last year at the same season which also seemed to be above the average although observations from earlier years at this season are very scanty. Considering the importance of learning the conditions in the season immediately preceding the southward migration of the spawning cod, it is hoped to make this December cruise along the coast an annual occurrence in the future.

The s.s. "Sotra" was used for a combined oceanographic and trial fishery expedition to the Bear Island waters. It left Tromsø on May 23rd and worked until the 12th of July. Besides the oceanographical work on the northern banks, sections were made between Norway and Bear Isle.

The m.c. "Havdrøn" was employed for a summer cruise on the West coast in June and July on research in connection with the sprat.

The m.c. "Hisø", a sealer, was fitted out for a cruise in arctic waters and left Tromsø on the 17th Aug. making sections between West Finmark and Franz Josefs Land, then over towards Kong Karls Land past Hopen and westward beyond the continental shelf, then S.E. over the Bear Island Bank and back to Norway on the 25th Sept. The cruise yielded some nitrate observations from high latitudes between Franz Josefs and Kong Karls Land showing a higher content even at the surface than ever observed in deep water near the coast of Norway.

In all, the following number of oceanographic observations was made during the cruises organized by the directorate of Fisheries:—

Cruise Dates	Area Observators	Stt.	Number of Observations on				
			T + S	O	Nitr.	P_2O_5	p_H
"Johan Hjort" I 12th—26th Feb.	West Coast Mr. Einar Lea	26	221	..	8	8	..
"Johan Hjort" II 27th Feb.—4th May	Coast and Lofoten Mr. Oscar Sund	111	1041	287	368	519	236
"Johan Hjort" III 6th—16th May	Bergen—Hardanger Mr. Paul Bjerkan	18	177	..	..	..	..
"Johan Hjort" IV 24th May—25th July	Finmark—Bodø Mr. Oscar Sund	114	1097	60	461	490	..
"Johan Hjort" V 19th Sept.—5th Oct.	West Coast Mr. Paul Bjerkan	36	355	..	..	..	..
"Johan Hjort" VI 4th Nov.—14th Dec.	Finmark—Bergen Messrs. Sund and Rollefsen	41	555	261	520	552	483
"Sotra" 23rd May—12th July	Tromsø—Bear Island—Tromsø Messrs. Iversen and Koefoed	117	1331	81	30	..	..
"Havdrøn" 18th June—20th July	West coast Mr. Paul Bjerkan	73	690	..	..	..	..
"Hisø" 17th Aug.—25th Sept.	Arctic Waters Messrs. Iversen and Koefoed	76	953	60	13	..	..
	Total...	684	6420	749	1400	1569	719

Professor Johan Hjort in 1929 organized investigations in the Møre waters and off that coast on the same plan as in the years 1926, 1927 and 1928. The observations were made by Mr. Trygve Braarud, Mr. Georg Klem and Mr. Johan Ruud.

After a preliminary investigation in the Romsdalsfjord in February, three sections were made from the inner part of the Romsdalsfjord across the coastal banks and beyond the continental shelf ("Storeggen"), viz. 18th—19th March, 8th—9th April, and 16th May.

The following oceanographic elements were determined at every station: temperature, chlorine, oxygen, phosphate, nitrate and ammonia, while samples for quantitative determination of phytoplankton and zooplankton were collected.

The oceanographical observations are being worked up by Messrs. Braarud and Klem, phytoplankton by Prof. H. H. Gran, zooplankton by Mr. Ruud.

The Geophysical Institute of Bergen has carried out a series of cruises with its research cutter the "Armauer Hansen". In May—June a cruise from Feie (near Bergen) to a point N.E. of the Faeroes. From June to the middle of July the "Armauer Hansen" made a section from Bergen across the North Sea into the Atlantic to the W. of Shetland. From the middle of July to the 15th of Aug. the vessel was used for fjord investigations, mainly current measuring, interrupted only in the beginning of August by the making of a section from Feie across the Norwegian Channel. During the rest of the year a monthly reconnaissance was made in a number of selected fjords in the vicinity of Bergen.

Biological Statistics.

Cod. The number of fish measured during the principal fisheries from February to June, incl., was about 48,000 which means a reduction in the number measured compared with the two preceding years of about 25 per cent., this was occasioned by the necessity of having the measurements made by specially engaged fish measurerers, as it has become more difficult to get responsible people to do the mesuring on a piece basis which is a much cheaper, but not an absolutely desirable method. Furthermore a new regulation enjoining the gutting and "heading" of the fish before it is sold, has made it very difficult to get fish measured on shore, the fish measurers have now to embark on the fishing smacks and stay out the whole day, measuring the fish as soon as it comes over the gunwale. If the boat has bad luck, which happens at times, the day of the fish measurer in question is lost if he can not get a chance to get into another boat early enough. Scale samples were taken to a limited extent owing to the dubious nature of the information gained from them, especially those taken from big fish.

The information rendered by the cod measurements and scale readings on the 1929 catch which was very rich at Lofoten, the most important district for spawning cod, although poor on the remaining parts of the coast, including Finmark, shows that the 1919 brood still constituted the bulk of the marketable sizes, as was expected. According to the scale readings it made up about 50 per cent. of the catch of spawning cod and this is also borne out by the measurements.

As the good broods hitherto have been connected with dry winters, it was hoped that the 1924 year class might turn out as a good one last year, as 1924 was a rather, though not very pronounced, dry winter. This hope has not, however, materialized, at least as far as the Norwegian catch shows, but reports from the fishing at Bear Island point to the conclusion that the Finmark catch was not representative of the Barents Sea population of cod, as the sizes corresponding to the 1924 year class were very prominent in some catches at least from areas far from the Finmark coast where the influence of the Atlantic current was very great in 1929, and presumably, hindering for a great influx of fish from the Barents Sea to Finmark. One British trawler coming from the Cape Canin region landed a cargo of cod at a Finmark port giving the same impression according to reports received.

Herring. From the spawning shoals were collected 27 samples of scales, from the fat herring fishery 25. Among the spawners the year class 1918 was still very prominent although the greatest percentage was made up by the 1923 group.

Sprat. The fishing was this year most prolific in the inner fjords, as is usually the case, while the preceding year was characterized by most of the catch being secured in the outer districts. The number of samples collected was 130 and demonstrated uniformly that the shoals consisted almost exclusively of one year old fish, the 1928 brood.

The fishing was peculiar in two respects, by the great admixture of small herrings in the sprat shoals and by the pronounced extension of the fishery in a northerly direction, a great quantity being taken to the north of Cape Statt. The size was very satisfactory, especially so in the northern districts, pointing to an early spawning and early immigration of the young in the autumn of the preceding year.

As the occurrence of young sprat from the 1929 brood was very scarce last autumn, the series of vertebral countings started in 1927 could not be continued except for a single sample from the East coast (Hvaler) where a figure of 48.06 was obtained. This is to be compared with the averages 48.70 and 48.00 for the years 1928 and 1927 respectively.

Haddock. A number of measurement series was obtained during the summer fishing in Finmark.

Germany.

In the year 1929 no oceanographical investigations were made in the North Eastern Area on the side of Germany.

On the other hand, however, regular investigations have been instituted in the Wesermünde fish market regarding the bionomics of commercially caught fish, i.e. from the Barents Sea. These investigations comprise measurements, weighings, age-determinations etc. and are executed by Dr. Johs. Lundbeck on behalf of the Biological Station, Helgoland, and as an extention of the work of this kind going on at that institution.

The investigation of Barents Sea fish being one of the tasks imposed upon Dr. Lundbeck, he will, as far as possible, endeavour to link up his work with the investigations made on the coasts of Northern Norway by his Norwegian colleagues. We are indebted to Mr. O. Sund for the proposals for this cooperation and the pointing out of the most important questions in connection with these investigations.

Dr. Lundbeck's activities during the first few months were engaged in getting into the technique and in the examination of North Sea material, but little opportunity was left during the summer for work on the Barents Sea catches. This was only possible in the last months of the year when, however, about 30,000 Barents Sea fish were measured, about equal numbers of cod and haddock. Little regard was paid to other fish this time (for instance, plaice).

Dr. Lundbeck found that the catches from the Skolpen Bank Area represented only a small proportion of the landings from the Barents Sea and consequently only a small number of the measurements were made on material from this area. The catches from the Cape Kanin area are different from the former as to sizes, especially the cod which is smaller, and it is to be expected that they agree roughly with the Norwegian Finmark measurements, while the Skolpen Bank fish would correspond with the Lofoten fish. Dr. Lundbeck is, however, not yet prepared to decide definitely on this point as the calculation of the measurements is not yet concluded.

The oceanographical and planktological material from the Barents Sea cruise of the "Poseidon" in 1927 has now been worked up and the results published in the paper by Schulz and Wulff: Hydrographie und Oberflächenplankton des westlichen Barentsmeeres im Sommer 1927. In: Ber. d. Deutschen Wiss. Komm., N. F., Bd. IV, H. 5, 1929.

As will be seen from the above report on the German activities kindly submitted by Prof. Mielck, a very great advance has been made in the study of the Barents Sea

fish by the introduction of extensive measurements of catches from the principal areas not covered by the Norwegian fishing fleet. The importance of this work when continued for a reasonable period, for the elucidation of several obscure points in the biology of the cod and the haddock population of the Arcto-Norwegian area, can scarcely be exaggerated, above all: does the cod, when once mature, spawn every year off the Norwegian coast within reach of the fishery there?

Scotland.

During the year under review two cruises were undertaken by the Scottish Research Vessel "Explorer" with a view of extending the hydrographic and plankton observations into the boundary region between the Northern North Sea and the North Eastern Area.

In May the hydrographic and planktonic conditions were investigated at appropriate stations between the Ve Skerries (Shetland) and Trangisvåg (Faroe). Trawling experiments were also made round Faroe and on the return journey the section between the Faroe Bank and the Butt of Lewis was investigated.

In the latter half of June the line between Muckle Flugga (Shetland) and Thorshavn was surveyed. Trawling experiments were repeated on the northern Faroe ground and on the return journey a hydrographic section from a point north of Faroe to the edge of the continental shelf between Shetland and Norway was examined. Plankton and drift net observations were made along this line. Only three herrings were caught in the drift nets.

The hydrographic observations have been submitted for publication in the Bulletin Hydrographique.

From the other countries which have been asked to submit reports on their work in the area, replies have been sent that no such work was done in 1929.

APPENDIX

Biological-Statistical Investigations of German Catches in the Barents Sea in 1928.

By

Johannes Lundbeck, Wesermünde.

Among the biological market investigations made since April 1929 by the "Institut für Seefischerei in Wesermünde" in cooperation with the "Biologische Anstalt auf Helgoland" the following measurements + age-investigations were made in respect of fish from the Barents Sea:— cod 15,337 + 854, haddock 13,815 + 376, plaice 1,135, other species 586 + 10, total 30,855 + 1,240. The measurements apply to 4 catches from

the Skolp Bank area in June/July, 6 catches from the same area in October/November and 11 catches from the Cape Kanin area in October/December.

General. The investigations showed that the few German expeditions which were made into the Barents Sea during summer were directed primarily into its western part, the Skolp Bank area. After the close of the herring trawling many more voyages were made, directed more frequently and principally to the fishing grounds round Cape Kanin. The difference in the composition of the catches, both as to time and place, is shown in the following average figures (in kg.) for the result of one voyage:—

Area	Skolp Bank		Cape Kanin
Month	VI/VII	X/XI	X to XII
Number of days of absence	24.0		25.2
Cod, large	25,400	8,421	17,772
Cod, medium	5,637	6,650	5,641
Cod, total	31,037	15,071	23,413
Haddock	22,298	25,609	34,486
Coalfish	68	1,485	—
Norwegian haddock	8,062	7,722	429
Catfish	2,003	714	1,173
Plaice	1,248	565	324
Sailfluke	378	127	28
Halibut	262	145	522
Various Species	83	78	87
Total...	65,439	51,516	60,462

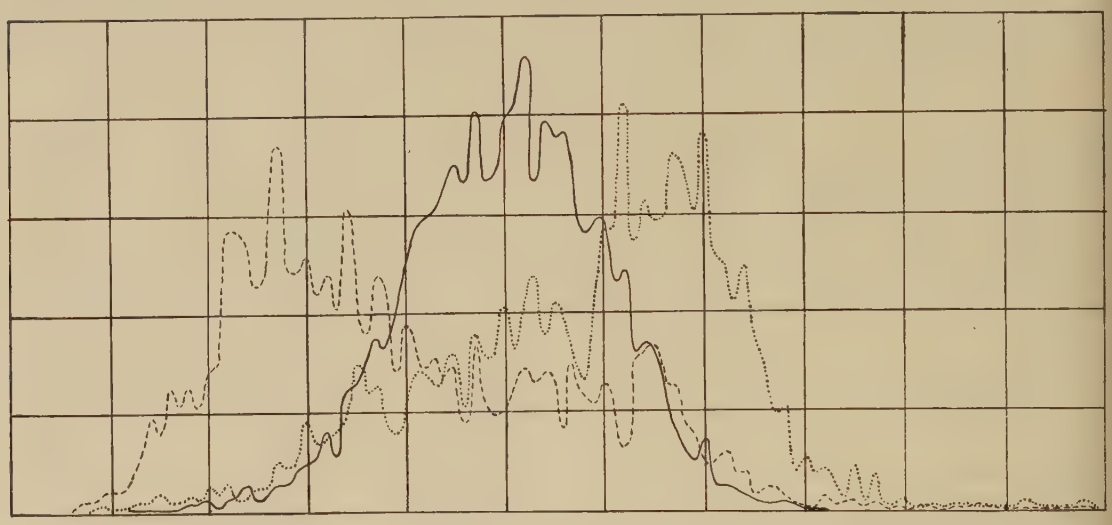
These figures explain to a certain degree the seasonal change in the selection of the different fishing grounds.

Cod. The difference in the length-composition of the cod catches from the Skolp Bank and Cape Kanin may be seen at a glance. The result of the measurements is shown on the graph below. On the Skolp Bank, the large fish predominated decidedly in summer, whereas they decreased considerably towards the end of the year when the small fish became very numerous. This holds good relatively as well as absolutely: as will be seen from the table below quality I (large) decreased to a third, while quality II (medium) increased by about 20 per cent. The conversion of the weight into the number of the fish shows this still more clearly:

	Skolp Bank		Cape Kanin
	Summer	Autumn	Autumn
Quality I	4660	1670	4060
Quality II	2240	4160	2340
Total...	6900	5830	6400

This is consistent with our hitherto existing knowledge of the migration of the North Sea cod; i. e. that the shoals proceed during summer to the east and the spawning fish in the beginning of winter to the spawning places.

The Kanin catches are constituted quite differently. The medium year-classes prevail decidedly while they invariably play a minor part on the Skolp Bank, both in summer and autumn. As to their length-composition they resemble the "Loddetorsk" of Finmark, while the catches from the Skolp Bank — not considering the small fish — can be compared with the "Skrei" of the spawning places off the Norwegian coast.



Curve of length distribution in permille (computed for each centimeter) of the cod caught in the Barents Sea.

——— Cape Kanin, October to December.
------- Skolp Bank, October to November.
..... Skolp Bank, June to July.

The age-composition gives the same picture as the length-composition (in per cent.):

Age-group	III	IV	V	VI	VII	VIII	IX	X+
Year-group	1926	1925	1924	1923	1922	1921	1920	1919 and older
Skolp Bank:—								
Summer	0.9	1.3	3.0	7.1	13.0	20.3	27.1	27.3
Autumn	11.9	21.6	17.5	14.1	13.1	11.3	5.9	4.6
Cape Kanin	0.5	3.3	10.7	23.6	34.2	17.0	7.4	3.3

A growth-rate of about an equal rapidity would tell against the opinion that the cod-shoals of the eastern and western Barents Sea belong to different races.

Haddock. The differences in the length curves are, as regards this fish, not nearly as great, but still a not unimportant increase of the smaller fish is apparent on the Skolp Bank in summer (Lengths from 45 to 60 cms.). The summer curve for this fishing ground is almost congruent with the autumn curve of Cape Kanin (the latter somewhat displaced as to the greater lengths), in both cases there is a decided maximum at 60 to 65 cms. The utmost length-limits lie at about 35 and 95 cms.

Also here the age-distribution corresponds to the length-composition (in per cent., only material from autumn).

Age-group	II	III	IV	V	VI	VII	VIII	IX	X+
Year-group	1927	1926	1925	1924	1923	1922	1921	1920	1919 and older
Skolp Bank.....	5.3	15.5	13.5	12.5	17.5	20.0	12.2	2.3	1.2
Cape Kanin.....	1.7	5.7	6.7	12.6	22.3	28.2	17.6	3.6	1.6

Other species of fish. On the Skolp Bank, the plaice were larger in summer (27 to 70, maximum at 40) than in autumn (23 to 60 cms., maximum at about 30); the autumn catches from Kanin had about the same composition.

Among the catfish (*Anarrhichas*), the species, *A. minor*, predominates considerably in the Barents Sea as contrasted with other seas; 243 individuals of this species were counted as against 55 individuals of *A. lupus*. The latter species is also smaller (limits 55 and 99 as against 55 and 129 in the case of *A. minor*).

NORTH WESTERN AREA
1929.

By

Johs. Schmidt.

The following work has been carried out by the various countries:—

England.

No work was carried out in 1929.

France.

Investigations of the fishery and the hydrographical conditions were made at the banks to the west of Greenland by Commandant L. Beaugé (Revue des Travaux de l'Office des Pêches maritimes. Décembre 1929, p. 369—411).

Germany.

The "Institut für Seefischerei", Wesermünde, made measurements of Icelandic material:— circ. 35,000 fish were measured, of which circ. 3,500 during the fishery at Iceland; particularly Haddock and other Gadoids and Sebastes were measured. For age-determinations of Gadoids circ. 1,900 samples were taken.

Norway.

The Geophysical Institute of Bergen made two cruises with its research cutter "Armauer Hansen" partly in the north-western and partly in the north-eastern area, viz. in May to June a cruise from Feie (near Bergen) to a point north-east of the Faroes, and from June to the middle of July, a section from Bergen across the North Sea into the Atlantic to the west of Shetland, was taken. The object of these cruises was general oceanography and current measurements, which were carried out by Prof. Helland-Hansen, the director of the Institute, Prof. V. Walfrid Ekman of Lund taking part in the second cruise mentioned.

Scotland.

1) General Statistics of fish landed in Scotland from Iceland and the Faroes for 1929.
2) Haddock measurements and scales from Faroe commercial catches landed at the Aberdeen market.

3) During May a hydrographic and plankton survey was carried out by the Scottish Research Vessel "Explorer" along the following sections:— Ve Skerries (west of Shetland) — Suderoe (Faroes) — Faroe Bank — Butt of Lewis. Trawling experiments were made with the commercial otter trawl round the Faroes and on the Faroe Bank.
4) In June hydrographic and plankton observations north of the Faroes. Drift net and trawling experiments north of the Faroes.

Denmark.

Trawling inside and outside the territorial limit in Faxe Bay. In 1929 the "Dana" was not able to carry out these trawlings owing to that vessel being engaged in the oceanographic expedition round the world at the cost of the Carlsberg Fund. The investigations were therefore, as in the previous year, carried out alone by the Icelandic inspection vessel "Thor", as arranged with the Icelandic Government, and were undertaken at different times of the year. Operations were conducted from the "Thor" by Dr. Bjarni Saemundsson. At the same time some hydrographic observations were made.

The trawlings were carried out, as in previous years, both inside and outside the territorial limit in Faxe Bay, and 18 to 20 hours trawling was devoted to each place. The trawlings took place from the 17th to the 19th February, the 7th to the 9th May, the 19th to the 25th July and from 8th to the 10th October. No trawlings have subsequently been undertaken, nor will these be continued by the Inspection ship "Thor", as this vessel became a total wreck on North-Iceland in December 1929, and consequently trawlings all the year round must be relinquished. These trawlings have, however, now been carried on for a series of years, having been started in 1924 by the "Dana", continued during the following years by the "Dana", assisted in 1925 by the Scottish Research Vessel "Explorer", and since 1927 by the "Thor" as well. The large amount of material thus collected is now to be worked up. The result of this is, in the main, abundantly clear, as has already been emphasized in previous reports on the subject, the quantity of fish being always considerably greater inside than outside the territorial limit. Conservation within the territorial limit must therefore be considered to play a very important part in the maintenance of the stock of certain economically important species of fish.

Collection of material for investigation of fluctuations in the stock of Cod in Icelandic waters. These collections were continued in 1929 (by Dr. Å. V. Tåning) and, as in the previous year, carried out during April to July on the four coasts of the island (viz. Westmanna Isles, Isafjord, Siglufjord and Nordfjord). About 16,000 cod were measured viz. about 3600, 3300, 4500 and 4200 at the four places respectively, and in addition to this scale and otolith samples, for age analysis, were taken from an adequate number of cod at the various places.

No considerable displacement within the stock has taken place at Westmanna Isles since 1928; some displacements is observable in the year-classes on the west and north coasts but to the greatest extent, however, on the east coast, from which

the plentiful year-class 1922 has partially migrated while the equally plentiful year-class 1924 is still numerous here. It is very likely that the year-class 1922 will play a very important part in the spring fishery of 1930 and the following years.

Marking of Cod in Icelandic waters. Marking in 1929 was conducted from the inspection vessel "Thor" at Iceland, principally on the banks off the south coast where the spawning cod congregate. Information regarding recaptures was, as usual, communicated to the Danish Commission for Fishery and Marine Investigations by the "Fiskifélag Islands".

Marking of Cod was also carried out at West Greenland, circ. 500 cod being marked for the Danish Commission for Fishery and Marine Investigation by Mag. sc. Paul Hansen ("Grønlands Styrelse").

The marking of Cod at Greenland has now been done for several years viz. since 1924. The total number marked at West Greenland is 1978 and at East Greenland 113, making in all an aggregate of 2091 cod.

The following shows the number marked each year and the number recaptured up to 20. VII 1930:—

	West Greenland		East Greenland	
	Number marked	Number recaptured	Number marked	Number recaptured
1924	416	13	..	..
1925	410	31	..	..
1926	342	4	2	0
1927	201	9	100	0
1928	109	1	11	0
1929	500	4	..	..

At West Greenland the markings were carried out at various places from Holstensborg to the south point of Greenland. At East Greenland they were done at Angmagsalik. The percentage of recaptures for the total number of years is, as regards West Greenland, 2.9 per cent.; the highest percentage for the individual years' experiments is 7.6 per cent. (markings made in 1925). The result has been that most of the cod marked at West Greenland have, during the years under investigation, migrated over only fairly short stretches, for instance, from one bank to another or from one fjord-system to another; six specimens, however, have left Greenland and migrated to Iceland.

Investigations as to migrations of the Herring in relation to its food. These investigations were continued in 1929 from mid-July to mid-September from Siglufjord. Material of plankton samples and of herring stomachs was collected by Mag. sc. Árni Friðriksson under the supervision of Prof. C. H. Ostenfeld.

Investigations as to the course of the surface currents round Iceland. The experiments with the throwing out of ordinary surface drift bottles, commenced in 1928, was continued in 1929. 300 of these bottles being thrown out from the Danish inspection ship "Fylla" (Orlogskaptain C. v. der Hude) at three places at

Iceland. The bottles were thrown out on the 14th February at Selvogsbanki on the south coast, on the 22nd February outside Látrabjarg on the west-coast and on the 8th March outside Seydisfjord on the east coast; 100 bottles were thrown out at each place. From the first place mentioned only one bottle has, as yet, been reported viz. from Julianehaab on the west coast of Greenland; from the second place three bottles, all from Iceland and from the third place 19 bottles, of which 2 are reported from Iceland, 6 from the Faroes and no less than 11 from the west and north coast of Norway. Otherwise the drifting of the bottles at Iceland appears to be somewhat the same as in the experiment made in 1928 (vide Rapp. et Proc. Verb., Vol. LX, 1929, p. 90).

Continuous hydrographical investigations in Faxe Bay. These investigations were continued in 1929 in a similar manner to those in previous years, and were carried out, as before, by the Danish inspection vessels stationed at Iceland.

Collection of material for investigating the fluctuations in the stock of Cod at the Faroes. These collections were continued at the Faroes in 1929 in a similar manner to those in previous years. The collections could, however, be accomplished at only a single place at the Islands, viz. at Suderoe, the fishery that year having proved a failure at the other places. The age analysis showed that the stock which was being fished at Suderoe consisted, to a great extent, of the year-class 1925, it constituted in fact about 56 per cent. of the catch; the same year-class predominated here in 1928 as well. It is intended to continue this work at the Faroes just as it will be at Iceland.

Continuous hydrographical investigations at the Faroes. These investigations were continued in 1929, as far as possible all the year round, with the assistance of the Danish inspection vessels in the same way as in 1928.

The collection of statistics of whaling at the Faroes as well as at Greenland was continued just as in all the previous years whaling was carried on at these two places. The statistics from the Faroes are sent from the whaling stations through the Faroe Amt, those from Greenland are submitted to the Danish Commission for Fishery and Marine Investigation by "Grønlands Styrelse".

Racial Investigations of the Cod in the North Western Area. In the course of 1929 the working up of the large material for racial investigations of the cod (*Gadus callarias*) in the Northern Atlantic with its tributary waters, was finished. The work is published in the series "Racial Investigations" by Professor Johs. Schmidt in Comptes rendus des travaux du Laboratoire Carlsberg Vol. 18, No. 6, 1930. As a large portion of the material is derived from collections made in the North Western Area and has been acquired partially through cooperation with the countries that have made investigations in that area, a brief survey will here be given of the results obtained.

The following material has been investigated from the North Western Area: From West Greenland racial investigations have been made on circ. 1060 cod, from

East Greenland circ. 360 cod, from Iceland circ. 3650 cod, from the Faroe Bank circ. 120 cod, from the Faroes circ. 2750 cod and from the Rockall Bank 91 cod. In all abt. 50 samples have been investigated from the area. The characters investigated are partly the number of vertebrae and partly the number of rays in D_2.

As regards West Greenland it may be pointed out that the investigations have shown that the populations have a lesser number of vertebrae than the American cod, but a somewhat greater number than the Icelandic cod and all other populations south-east of Iceland. Labrador and the north coast of Newfoundland present average values of vertebrae of circ. 55 or over (highest 55.48), while this value at West Greenland lies at 53.5. The value of D_2 is very high at America viz. circ. 20.5 or above that; at West Greenland this value is also high, viz. circ. 20 or more. At Iceland and in other European waters D_2 does not reach these high values.

The cod populations of East Greenland present a slightly lower average value, as regards vertebrae, than that of West Greenland, but it will, however, be necessary, as regards that part of Greenland, to procure a larger material for the investigation of the relation of that area to the north-west Icelandic cod area. An age analysis of cod from East Greenland (Angmagssalik) in 1927, showed that the year-class 1924 was very richly represented; this year-class is also plentiful at Iceland for which reason it is desirable that a more thorough investigation of the racial characters than possible at present, should be made.

As regards Iceland it may be stated that a distinct increase is to be observed in the number of vertebrae from the warmer south and west coast to the colder north and east coast to wit, a rise in the number of vertebrae with falling temperatures, which is perfectly concordant with the results from the entire northern Atlantic, taken as a whole, the average values rising with falling temperatures. The values as regards vertebrae at Iceland lie between circ. 52.3 and 53.3 and for D_2 usually between 19.5 and 20.

The Faroes present somewhat lower values than Iceland (vert. circ. 52.0 to 52.5), and the Faroe area is in sharp contrast to the Faroe Bank, the population of which is considered to be self-containing as it has a low average of vertebrae (< 52) and in respect of the characters investigated, more closely resembles the population of the Rockall Bank and the more southern areas washed by Atlantic water; the Rockall Bank displays the lowest value any cod population has ever exhibited (vert. 51.47).

The investigations have clearly shown certain interesting variations in respect of the time and place for the various samples of cod.

1) Variations in the average figures from year to year appear, for instance, prominently in a series of samples from the east coast of Iceland (Seydisfjord) for the years 1924 to 1927; the average values of vertebrae fluctuated in these years between 52.6 (1924) and 53.1 (1925). Similar variations have also been observed within other parts of the distribution area of the cod.

2) Moreover the investigations at Iceland, as well as at the Faroes and other places in the area investigated, have shown that populations living in the deepest water, farthest away from the coasts generally have higher values than those living nearer to the coasts and inside the fjords. It can for instance, be stated

that in the innermost part of Trondhjem Fjord, Norway, the average value of vertebrae was 52.35 whereas the value outside the fjord was 53.76.

From the Faroes may, for instance, be mentioned an investigation at the northern islands, where whole series of samples from inshore waters, had average values of vertebrae lying between *52.10* and *52.29* while another series of samples from open waters had values lying between *52.39* and *52.49*.

We find quite a similar state of things at Iceland, where the corresponding figures for a series of samples gave the following result:—

	Inshore waters	Open waters
S.W. Iceland.....	52.29	52.61 to 52.79
N.W. Iceland	52.62	52.96
E. Iceland	52.79 to 52.86	53.16 to 53.29

These investigations recollect the corresponding results arrived at by the racial investigations of *Zoarces* (Johs. Schmidt, Racial Investigations I, *loc. cit.* XIII, 3, 1917).

In respect of the cod population in the northern Atlantic it may then be pointed out that it consists of a mosaic of mutually differing populations which may be widely distributed or very localized (at the Faroe Bank for instance). Further that there is a distinct correlation between, for instance, the average number of vertebrae and the temperature, as the number of vertebrae rises with falling temperatures. Finally it can be emphasized that the average number of vertebrae may vary from year to year, and that the inshore populations have lower values than the open water populations.

PLATEAU CONTINENTAL ATLANTIQUE

1929.

(Atlantic Slope).

Par

Ed. le Danois.

Le programme du Comité ayant subi peu de modifications, et ayant été publié déjà par le Conseil International, je crois inutile de le reproduire dans le cadre du présent rapport.

En ce qui concerne les croisières, je vous adresse, par contre, un tableau indiquant par mois et par pays les sorties effectuées par les navires de chaque nation dans le Secteur du Plateau Continental Atlantique. Il peut se résumer comme suit:

Angleterre: Sorties périodiques mensuelles du navire "Salpa".

Irlande: Sorties du navire "Muirchu" en Février, Mai, Juin, Août et Décembre.

France: Croisière du navire "Sentinelle" de la Marine Nationale, en Mai et Juin. — Croisière du garde-pêche "Pétrel" en Juillet.

Espagne: Sorties du navire "Laya" en Juin—Juillet. — Sorties du navire "Xauen" en Septembre et Décembre.

Portugal: Croisière du navire "Albacora" en Février, Mars et Août.

Les résultats de ces diverses croisières feront l'objet du prochain rapport annuel pour l'année 1929.

1929	France	Grande-Bretagne	Irlande	Espagne	Portugal	Observations
Janvier	....	Salpa	....	....	....	....
Février	....	....	Muirchu	....	Albacora	Sorties périodiques
Mars	....	Salpa	....	....	Albacora	....
Avril	....	Salpa	....	....	....	....
Mai	Sentinelle	....	Muirchu	....	....	Sorties périodiques
Juin	Sentinelle	Salpa	Muirchu	Laya	....	....
Juillet	Pétrel	Salpa	....	Laya	....	....
Août	....	Salpa	Muirchu	....	Albacora	Sorties périodiques
Septembre	....	Salpa	....	Xauen	....	....
Octobre	....	Salpa	....	....	....	....
Novembre	....	....	....	....	....	....
Décembre	....	....	Muirchu	Xauen	....	....

COMBINED NORTH SEA
1929.

By

David T. Jones.

The Committees charged with the conduct of the investigations in the two divisions of the North Sea have continued their labours in close co-operation and, as indicated in the subjoined Area Reports, a great deal of useful work has been carried out during the year. An important concentration of effort on the various aspects of the difficult herring problem is recorded and gratifying progress continues to be made with the haddock investigations, with emerging results which promise to be of great practical value.

NORTHERN NORTH SEA

By

A. Bowman.

General.

In continuation of the procedure of previous years and in accordance with the recommendations of the Committee the investigations have been focussed mainly on the elucidation of problems concerning the herring and haddock in relation to their animate and inanimate environment. One of the most important items in the scheme of research has therefore been the continuous and detailed analysis of the composition of these stocks over as wide an area as possible.

In Germany the herring has again been the principal subject of study in the "Fischereibiologische Abteilung des Zoologischen Staatsinstituts", Hamburg (Director, Prof. Ehrenbaum). The statistics of the German Herring Fishery have been worked up as before, special attention being again paid to the catches of trawled herring and exhaustive reports have been published (by Dr. Lissner) in the "Fischerbote" and in the official "Jahresbericht über die deutsche Fischerei". The record yield of the German Trawl Fishery in 1928 was surpassed by a new record in 1929 (almost 70 mill. kg.) and as these excellent results are for the most part to be attributed to improved methods of catching the further possibilities of development in this direction have been carefully studied.

The fishing grounds of the German Herring Drift Net Fishery have also been worked up from a large number of log books furnished by Captains of drifters as in former years and the charts published (Berichte der Deutschen Wissenschaftlichen Kommission, Bd. V, 1).

The analysis of the stocks of fish which form the actual basis of the German herring fishery in the Western North Sea has been continued by Dr. Lissner and their changing composition according to year-classes established. For this purpose, as in former years, a number of representative samples was analysed with reference to body-length, sex, maturity and age.

In Scotland the records of all landings of herrings at each fishing port have been kept by the District Fishery Officers. The data of the number of landings by the different types of fishing vessels and the total quantities of herrings landed have been supplemented by detailed information regarding the fishing grounds and the quality of the herrings caught. Numerous representative samples of herring from commercial catches have been examined in detail at the Aberdeen Laboratory. Most of these samples have been procured during the great summer herring fishery off the Scottish East Coast and from the trawled herring of the Fladen Ground but samples have also been obtained during the winter fishery in the Firth of Forth and Firth of Clyde. The data has been augmented by material obtained from drift-net experiments with the "Explorer" and also by numerous samples obtained from the small meshed covering of the otter trawl during the trawling cruises. Samples of the youngest age classes have also been examined from the boom net catches in the estuaries of the Forth and Tay.

The records of occurrence of "spawny" haddocks in the commercial catches which were commenced in 1921 have been continued without interruption every year.

In Scotland the basis of the analysis of the changes taking place in the abundance and distribution of the marketable stock of haddock in the North Sea has been the monthly landings from each unit statistical area as ascertained from the combined English and Scottish data. Ichthyometrical data consisting of 88,000 haddock measurements made at sea on commercial vessels were handed over to Scotland for treatment by the Ministry of Fisheries (England). Age-analysis of the commercial catches were made chiefly on scale material collected in Aberdeen Market where also representative samples of the different trade categories were measured. For the relative frequency of occurrence of the different year-classes reliance was placed chiefly on the copious scale samples taken during the trawling cruises of the "Explorer".

On behalf of the "Biologischen Anstalt auf Helgoland" market measurements were carried out by the Institut für Seefischerei, Wesermünde. 27,051 fish from the Northern North Sea area, a very large proportion of which were Gadidae, were measured during the year covered by the Report and age-determinations of 1020 of these were made. The measurements etc. were first undertaken in May after the assistant who was entrusted with the work had become thoroughly acquainted with it and a small proportion of them were also made on board steam fishing vessels during their cruises in which Dr. Lunbeck took part.

Work at Sea.

Where such a wide field of investigation has to be covered it is to be regretted that only one Research Steamer was maintained in commission for the greater part of the year.

France has continued the oceanographical observations during the herring season from the Fishery Protection Vessels "Sentinelle" and "Estafette", records of temperatures and salinities together with meteorological observations and fluctuations of the fisheries being taken as usual.

As a continuation of the investigations carried out in August—September 1928 on the northern herring fishing grounds a 14 days' cruise of the "Poseidon" under the direction of Prof. Ehrenbaum was undertaken in the region of the Dogger Bank and neighbouring grounds. A new herring trawl was tested, material bearing on the composition of the herring stocks was collected and observations made on the occurrence of herring larvae and young.

During the year eleven special cruises were completed by the Scottish Vessel "Explorer", the vessel being kept in continuous commission from the month of February until mid-December when she was laid up for overhaul.

The cruises were arranged mainly with a view to extending and elaborating the researches on the herring and haddock species in the light of the experience gained in previous years. Routine trawling, hydrographical and plankton observations were carried out on all cruises, the trawling experiments being made with the commercial otter trawl with small mesh covering over the cod-end.

The following is a brief outline of the cruises undertaken during the year and of the main objects of investigation on each cruise.

February: Experiments on small haddock grounds with the commercial trawl with different sizes of cod-end mesh.

March:

(a) Trawling observations on the haddock spawning grounds of the eastern border of the Northern North Sea.

(b) Inshore investigations on the small plaice of the East Coast of Scotland and Firth of Forth.

April: The frequency of occurrence and distribution of the 1928 haddock brood on the inshore and offshore grounds of the East of Scotland southwards to the north edge of the Dogger Bank.

May:

(a) Extended hydrographical and plankton survey on the itineraries Aberdeen—Shetland—Faroe—Faroe Bank—Butt of Lewis—Minch—North of Scotland—Aberdeen.

(b) Trawling observations at Faroe, Faroe Bank, north of Scotland, outer Moray Firth and East Coast of Scotland.

June—July:

(a) Extended hydrographic and plankton survey Rattray Head—North of Shetland—North of Faroe—edge of continental shelf between Shetland and Norway—Shetland—Aberdeen. Trawling observations in North Sea and at Faroe.

(b) Drift net experiments on the Scottish summer herring fishing grounds and in the Norwegian Sea.

July—August:
(a) Survey of the West Coast of Scotland including Firth of Clyde.
(b) Plaice investigations in Luce Bay.
(c) Plaice transplantation experiments from Luce Bay to Loch Indaal (Islay).

September:
(a) Trawling cruise between Firth of Forth and Jutland Bank.
(b) Plaice marking experiments on the East Coast of Scotland.

October:
(a) Plaice transplantation experiments from St. Andrews Bay to Shetland.
(b) Hydrographic and plankton observations between Aberdeen and Shetland.
(c) Distribution of post-larval clupeoids.

November: Distribution of post-larval clupeoids from Aberdeen to north edge of Dogger Bank.

November—December:
(a) Mesh of Net experiments.
(b) Plaice transplantation experiments from St. Andrews Bay to Dornoch Firth.

Herring.

The investigations undertaken by Scotland on the early life history of the herring have been concerned largely with the location of the spawning places and their relation to the movements of the maturing shoals, the dispersal of the larvae from the various hatching centres and the relation of the larger transition stages to the youngest scaled forms of the 0-group. The observations have amply confirmed the results of previous investigations as to the location of the spawning places. These remain remarkably consistent in position from year to year. Although spring and autumn spawning may occur in the same localities no grounds have been found equally important both for spring and autumn spawning. The most important autumn spawning grounds occur more or less continuously along the western side of the North Sea from the Shetlands to the Dogger Bank within the 50-fathom contour line. Most intensive spawning occurs, however, within a depth of less than 40 fathoms and there is no evidence of spawning beyond 50 fathoms. Autumn spawning also occurs along the North of Scotland from Cape Wrath to the Orkneys but no autumn spawning of importance has been observed on the West coast of Scotland south of the Minch although this region has been surveyed at the appropriate season for three years in succession. The important spring spawning grounds with the exception of those in the vicinity of the Firth of Forth lie outside the limits of the North Sea, at Shetland and off the north-west Scottish coast where they are under the influence of Atlantic rather than the North Sea conditions. Spawning is also confined chiefly to places of moderate depths except in the Viking Bank area and at Shetland where spawning appears to occur down to a depth of 100 fathoms.

Some spring spawning varying in intensity in different years may occur East of Orkney and on the north-west coast of the Moray Firth probably as an extension of the spawning shoals from the north of Scotland. The spring spawning in the neigh-

bourhood of the Firth of Forth although occurring with the greatest regularity is extremely local in its incidence. There are indications of occasional spring spawning of small amount off the Aberdeenshire coast. Confirmation of spring spawning on the eastern edge of the North Sea plateau from Ling Bank to the Viking Bank has again been obtained.

No abnormalities regarding the dispersal of the larvae have to be recorded. Special features of the investigations were the cruises (1) in April and September across the region of the Dogger Bank (2) in March from Aberdeen to the Fladen Ground, Ling Bank and Viking Bank (3) in June across the 100-fathom line to the North of the Shetlands and (4) in August along the West Coast of Scotland to Luce Bay and the Firth of Clyde.

The product of the spring spawners of the Firth of Forth appears to be localised within a radius of 30 miles from May Island, the larvae occurring most abundantly within the estuary of the Firth of Forth and in St. Andrews Bay. During April captures of herring larvae ranging in size from 17 to 38 mm. were made along the north and north-east edge of the Dogger Bank. These appear to agree with the similarly-sized larvae recorded from the same area by Mielck (1929) and entered in his April chart as outliers from the main distribution of large larvae nearer the Danish coast.

No larvae of spring origin have been taken in the central part of the area except in the deeper region between Shetland and Norway.

The larvae of autumn origin are most abundant in the coastal region from Moray Firth southwards. The Scottish observations indicate, however, considerable movement of autumn larvae from the spawning grounds southwards and eastwards through the "Gut" from September to November but the limited sampling to the east of the "Gut" gave almost negligible results. During the spring months, however, larger larvae occur in small numbers in this area as well as across the north of the Dogger Bank suggesting a transference of a proportion of the autumn brood to the east side of the North Sea.

Efforts have been made to define the offshore limits of the larger transition stages of herring larvae but with little success so far as distance from land is concerned. A few intermediate stages have been taken in the "Gut", east of the Fladen area, and north-east of the Dogger Bank but the majority of the captures are recorded from coastal waters, the larger forms being secured in the littoral zone.

Representative samples of the largest sizes have been examined morphologically and two main types have been recognised, one metamorphosing at a length of 45 to 50 mm., the other about 60 mm. The larger type has been taken only in June on the East Coast of Scotland and on the west of Shetland and these have been interpreted as autumn progeny. So far as these particular observations have gone no fully developed stages of the autumn brood have been taken at the end of the year in which they were hatched though larvae between 40 and 45 mm. have been observed about halfway through metamorphosis.

The smaller type has been identified in the Forth estuary in October, on the Scottish East Coast in July, and on the West Coast of Scotland and at Shetland in July and August. The East Coast type is distinctive, especially in regard to the large size

of head, and depth of body, while the West Coast type has a large head but rather attenuated body. Investigations on the morphological characters of these are proceeding.

During 1929 there has been published an important and well produced work by Dr. Schnackenbeck on the "History of the Development of and Morphological Investigations on the Herring" (Berichte der Deutschen Wissenschaftlichen Kommission, Bd. V, 2) which is closely related to the racial investigations. From an extensive material comprising young herring from different localities, it establishes how far differences in the development of different local forms are recognisable. In particular it treats of the question how, and at what stage, the skeletal characters used to separate the races appear during the development with a view to determining how far the action of external influences can be held responsible for their stabilisation.

Reference has already been made to the investigations which are in progress regarding the composition of the adult shoals. In Scotland a paper by H. Wood on the "Pre-Spawning and Spawning Movements of the Herring Shoals in Scottish Waters" is now in the Press. The analysis is based on the examination of copious material collected over a series of years. There is no evidence that the maturing herrings caught by trawl on the Fladen grounds in August and September spawn on the Scottish East Coast during the normal autumn spawning season and the spawning grounds of these have still to be determined with security.

The racial investigations already begun in Scotland have been continued and extended to several areas. Detailed examination of samples from the Clyde proves clearly that herrings with two distinct types of growth may occur in the area. This feature is particularly noticeable amongst the immature fish with one or two rings on the scales. In one type the first winter ring is small, while in the other it is abnormally large indicating that the stock may be recruited from different sources.

In Germany the racial investigations on herring which are in the hands of Dr. Schnackenbeck have been steadily advanced by the acquisition of as varied material as possible. A new publication is in preparation.

France has collected material on the herring trawling grounds (Fladen and Gut) for racial investigations and to make possible comparison with the other populations of herring occurring in the North Sea.

Haddock.

The results of the Scottish haddock investigations will be summarised by Dr. Thompson in his paper on "Fluctuations".

The routine work of determining the distribution movements, and the relative numbers of the year-classes of haddock in British and Faroe waters was continued. The basis upon which this work rests, namely, the determination of the fundamental data by means of cruises of the research vessel, and the application of these to the broad statistics of the results of the commercial fleet, has again proved reliable. It can now be stated definitely that from the outset of its life a year-class can be evaluated with sufficient accuracy to allow deductions to be made of its probable current and future yield.

The immediate practical application of this work will almost certainly come to be the publication of definite haddock fishing forecasts. At present the task of forecasting in some detail is being undertaken by way of experiment, and no attempt is made here to do more than continue the commentary, begun in recent years, upon the broad aspects of the changes taking place in the stock.

In the year 1928 the successful 1923 year-class had ceased to be of importance, the fairly successful 1926 brood having in that year the chief influence on the catches. In 1929, this brood, then in its fourth year, continued to yield the bulk of such medium-sized haddocks as were caught, but it has now been reduced to about one-sixth of its original numbers, and has, moreover, followed the course of the older fish in concentrating in northern and western waters, where it should continue for a year or two to yield fair numbers of moderately large fish. The central, and southern areas of the North Sea will therefore, as is usual, be dependent for their stock upon the more recent broods. Two of these — those of 1927 and 1929 — have been so unproductive of brood haddock as to be of little significance. That of 1928 has, however, proved as prolific in numbers as was that of 1923 and must receive special consideration. It has been mentioned before that the initial distribution of a brood (that is the distribution in the first year) has an all-important influence upon its ultimate sphere of usefulness. In the case of the important 1923 brood great numbers were allied to widespread distribution over the central and the southern portions of the North Sea, in the latter of which growth is fast. The Shetland and N.W. Scottish areas were poorly supplied. The result was that the brood grew rapidly and soon became the object of widespread fishing operations. Now the equally numerous 1928 brood was in its first year distributed over the western and northern portions of the North Sea, enormous numbers (more indeed than those produced by any post-war brood) being found round Shetland, and very few in the southern portion of the North Sea. The brood will therefore tend to produce increased catches in north-western waters for two or three years, while diminished catches may be expected from the southern and eastern portions of the North Sea (Dogger Bank, Fisher Bank etc.). In this large area during 1929 the numbers of fish of this brood caught were approximately only half of those of the 1923 brood caught in the same area during its second year. Otherwise the greatly increased catches of small-medium haddock in the west and north-west should tend again to raise the general North Sea catch considerably above normal in the autumn of 1930 (the catch, as was anticipated has fallen in recent months below normal).

In recent years the total weight of haddock landed from the North Sea has been maintained, but only owing to increased fishing effort, aided by more efficient catching gear. It is of interest to note that our calculations tend to show that the most recent successful brood (that of 1926) has had its numbers thinned out at a more rapid rate than were those of the 1923 brood, which in turn was more rapidly depleted in numbers than was the successful 1920 brood.

A third year of the examination of the foods found in the stomachs of haddock has been completed. Some comments on the nature and outcome of this work were given last year. It was found that the volume of food consumed by haddock of various

regions could be directly correlated with the resultant growth rates of the fish. For example the volume found in the stomachs of the average Iceland and Faroe haddock which is a rapid grower is much greater than that found in the stomach of the average slow-growing North Sea haddock. This study of the variations in the annual outcrop of food species is of basic importance in the biological study of the fish itself. It is aiding the proper delimitation of natural sub-divisions of the North Sea area and helps to explain some of the major migrations of the haddock. The study will ultimately become intensified upon a selected few of the more important food species, whose appearance or non-appearance in certain years seems to be of the utmost importance. In order, however, to obtain a more complete knowledge of the annual variations in the time and degree of occurrence of these species it is necessary that the work proceed on its present lines for a year or two longer. This extension of time is also necessary to enable the chemical estimation of the food values of the various food species to be completed.

Some preliminary work upon the rate of digestion found in haddock has tended to indicate that this rate is much slower than might be expected. In no case is a small meal likely to be eliminiated from the stomach in less than one day, and ordinarily this period of time is probably exceeded. Non-fatty food, such as mussel, is much more rapidly digested than a fatty food such as herring. Digestion appears to be more rapid in summer than in winter.

Plaice.

While the focussing of the investigations on the herring and haddock and particularly on those problems of direct and immediate importance to the fisheries has given direction to the work, other species such as plaice, lemon sole, witch, and skate have also received some measure of attention.

In Scotland the introduction of auxiliary power in the smaller fishing vessels and the adoption of the Danish seine net or a modification thereof has brought about great changes in the incidence of fishing on the plaice stock in the coastal zone. It would obviously be impossible for a single research vessel to survey continuously the changes taking place in the stock on every part of the coast and in view of the manifold other duties the observations of the Research Steamer have been restricted to periodic visits to the more important plaice areas. These visits have been arranged as an extension of the programmes and the work has been concentrated on plaice marking and age-determination. The movements of the adult fish on the East Coast of Scotland are fairly well understood and therefore the marking of adult fish has been confined mainly to Shetland waters and to the north and west of Scotland where our knowledge of the relation of spawning grounds to nursery grounds is as yet quite meagre. The marking of plaice, on the east coast, has therefore been limited to the younger age-groups occurring within the territorial waters. These marking experiments have proved of the utmost value for a proper understanding of the changing conditions. The returns of marked fish provide direct evidence of the intensity of fishing in special localities which could not have been so clearly ascertained from frequently recurring visits of the research vessel to the area. The marked fish have also proved invaluable for a study of the growth rates of the species.

Investigation of the comparative growth rates of small plaice in different inshore areas has also been carried out by means of marking experiments. In July 1927, 600 plaice, ranging in size from 20 to 25 cm., caught in St. Andrews Bay, were marked and transplanted to the east coast of Shetland. At the same time plaice were marked and liberated in St. Andrews Bay as a control experiment. In July of the following year the St. Andrews Bay specimens showed an average growth increment of approximately 3.0 cm., while the transplanted specimens at Shetland had an increment of over 7.0 cm. In July of the second year the St. Andrews Bay specimens had an average increment of less than 7.0 cm., while the average increment at Shetland was 15.0 cm.

Six hundred small plaice were also transplanted from the Dornoch Firth to the east coast of Shetland in August 1927, control experiments also being made in the Dornoch Firth. The transplanted plaice grew at approximately the same rate as those transplanted from St. Andrews Bay, but the plaice left in the Dornoch Firth showed a slightly faster growth rate than those in Shetland waters.

Both the transplanted plaice from Shetland and the Dornoch Firth plaice showed considerable growth before the advent of winter but the marked plaice left in St. Andrews Bay as a control did not show any growth increment until the year following marking. The plaice returned from Shetland waters show a distinct check on the otolith due to transplantation.

The slow growth in St. Andrews Bay may be due to the weight of numbers on the grounds. In Shetland waters there appears to be plenty of food for the numbers of plaice on the grounds although conditions there appear to be otherwise less favourable for the natural development of a large plaice stock.

These transplantation experiments have been repeated during the year under review.

The preliminary results of the transplantation of 600 small plaice from Luce Bay to the Island of Islay (West Coast of Scotland) in August 1929 may be mentioned here. Only seven transplanted fish have been returned to the Laboratory so far but all of these were recaptured in the Firth of Clyde. One was caught in that area after only 42 days' freedom. These results are in striking contrast to the experiments at Shetland, only two specimens having left the area since transplantation.

Hydrographical and Plankton Investigations.

So far as the means at the disposal of the Committee would permit, the continuity of the hydrographical and plankton observations was made an integral part of the programme of each cruise. The concentration of the investigations on the herring and haddock species precluded the regular repetition of observations at "fixed" stations in linear arrangements. The scope of the investigations may be ascertained from the itineraries of the different cruises.

The salinity determinations were made in all cases by the Government Chemist and the hydrographical data were later transmitted in the prescribed form for publication in "Bulletin Hydrographique".

The investigations by means of drift bottles of the surface current system of the North Sea and Faroe-Shetland Channel have continued to form an integral part of the hydrographical researches carried out by the "Explorer" since the year 1920. The continuation of these experiments has been prompted by the results obtained from similar operations carried out in the five years 1910—1914 (inclusive). A comprehensive report by Mr. J. B. Tait on the results of these earlier experiments is now in the Press.

During the year covered by the present report 500 bottles were despatched from 50 stations distributed over (a) the northern reaches of the Faroe-Shetland Channel (b) the Wyville-Thomson Ridge (c) the north-western area of the North Sea and (d) the region between longitude 2° E. and the west coast of Denmark.

In the early months of the year, the collections made by the Standard Vertical Net showed in the northern part of the area a very rich micro-plankton both east and west of the Scotland-Shetland line. This plankton was characterised as early as March and on the west side as well as on the east side, by the presence of "Atlantic" forms in numbers which were much greater than is usual at this season. In June the phyto-plankton in this area, though similar in character, was considerably less in quantity, a more or less normal phenomenon but later in July and August on the west when ordinarily a rich summer plankton is to be found the collections were, almost without exception, very poor.

An interesting feature was the presence in considerable numbers in the collections from March to the middle of May of the exotic diatom *Biddulphia sinensis* both on the Atlantic side and in the Northern North Sea. This diatom, first observed in north European waters in 1904, has not occurred, except for solitary specimens, in the Scottish collections since the period from 1904 to 1907 when it was present, at times in fair numbers, off the Norwegian coast between 61° and 62° N. lat.

During the year the intensive study of the seasonal distribution of the various developmental stages of *Calanus finmarchicus* by means of numerous quantitative hauls has been in progress.

SOUTHERN NORTH SEA

By

W. Mielck.

A. Preliminary.

During the year under review the work of the Committee proceeded, on the whole, on the same lines and was directed towards the same objects as were explained in the introduction to the last Report.

Progress has been made not only in the scientific sense but also from a practical standpoint. The principal study, devoted to the annual fluctuations in the composition and size of the stocks of the most important species of fish, was promoted in our area

especially as far as herring, plaice, and soles are concerned, and led in the case of the herring to the practical result that the English research workers were able to predict a good yield for the autumn fishery off the east coast of England. This prediction has proved correct.

Well substantiated data were in existence which would have justified such a prediction — which was, however, not made in practice — for the catches of soles in 1929 in the German Bight. A particularly numerous year-class (1924), which had grown up here, promised an especially good yield in this as in the previous year. Contrary to expectation this hope has not been fulfilled, owing probably to the extremely severe period of cold weather at the beginning of 1929, during which many soles succumbed whilst others abandoned the German Bight. A natural phenomenon of this kind should, however, from another standpoint be welcomed as particularly useful for this very study of the problem of fluctuations. The observation and further study of the effects of this phenomenon, which was as it were an experiment conducted by Nature herself, should facilitate that task relating to the practical side of this problem, which originally led to its study in connexion with the bottom fishes in the southern North Sea, namely the comparison of the importance of the changes in the fish stock brought about on the one hand by natural laws and on the other by fishing operations, both of which may have good or bad effects. The result of this comparison, i. e. the discovery of which factor is of decisive importance, will enable us in a higher degree than hitherto to judge the suitability of measures for protecting and promoting the fishery.

With regard to the work which was devoted to testing the possibility of protecting the young fish not yet fit for human consumption, the experiments conducted energetically by several countries with the so-called saving cod ends and with cod ends of different meshes were the most important. The results obtained in this year lead us to expect far-reaching progress towards the solution of this problem.

Work at Sea.

In Belgium the general purpose of work was the study of littoral fishing, special attention being paid to young pleuronectids (plaice, dab, flounder, sole) and to the whiting. Experimental trawling has been carried out on board the "Oithona" in a band of 25 miles in breadth along the Belgian coast, and close to the strand on the motor boat "Apekal" with a peculiar stramin trawl and further out with the Johansen trawl.

The "Japetus Steenstrup" was employed in May and September in the western part of the Limfjord and in the adjoining parts of the North Sea for fishing experiments with a fine-meshed trawl.

The Research Vessel "George Bligh" was in continuous commission from February to November, all her cruises being in the Southern North Sea except in August. The North Sea work was distributed as follows:— Eight voyages primarily for the investigation of the releasing power of cod ends of different meshes and of saving apparatus; four primarily for plaice investigations during which further data was acquired on the releasing power of cod ends; two for investigations on young herring in the coastal area;

four for hydrography; eighteen voyages in all. Cooperation with a fishery patrol vessel was secured in one of the Hydrographical voyages.

The English fish measurers, thanks to the courtesy of owners and skippers of fishing vessels, have continued their work at sea.

The work undertaken by France in the southern North Sea and English Channel was carried out on board the Fishery Patrol Vessels "Sentinelle" and "Estafette", and the Despatch Boat "Quentin Roosevelt", and on the voyages of fishingvessels (trawlers and drifters).

The Research steamer "Poseidon" undertook three cruises, of which two were conducted by the Heligoland Institute and the other by the Hamburg Institute. The "Deutsche Seewarte" took over the hydrographical investigations. On the first cruise, conducted by the Heligoland Institute (May 2nd—24th), the eastern North Sea between the coast and the 40 metre line from Haaks Lightship to Hanstholm was investigated, also the "Oyster Ground" and the entrance to the Skagerak. The most important objects were: the distribution and composition of the fish stock, age-determinations especially of the plaice and soles; the quantity and distribution of the fish fry, in particular of the herring, plaice, and soles; the bottom population of the "Valuation Area" which is examined at regular intervals, off Norderney-Borkum and in other regions; intestinal contents of the fish; experiments with saving trawls; conferences with Belgian, Dutch, and English experts at Den Helder. — On the second cruise conducted by the Heligoland Institute (Oct. 4th—9th) investigations of the bottom and of the fish stock were undertaken in the "Valuation Area". — The objects of the cruise conducted by the Hamburg Institute (Oct. 10th—22nd) in the area of the Dogger Bank and the adjacent herring fishing grounds were first and foremost the observation of the occurrence of larvae and young forms of the herring, the collection of material for checking the stock and the testing of a new herring trawl. Supplementary biological and hydrographical observations were made simultaneously in the same waters on the Fishery Patrol Boat "Zieten". — Regular control observations of the fish stock between Heligoland and the coast were made on numerous short cruises of the "Augusta" as were also observations on the occurrence of the herring fry. — Small motor boats were used for the regular investigations of the young flatfish close inshore.

At the end of May an excursion conducted by the Rijksinstituut voor Biologisch Visscherijonderzoek was made with the trawler "Gerbrig" from Ymuiden into the eastern North Sea for the purpose of carrying out experiments with the saving trawl. In July and August investigations on young fish were made along the Dutch coast. — The Government motor-boat "V. I. 2" was made available last year for investigations inshore, and now in addition the new Fishery Patrol Vessel "Nautilus" is to be equipped for scientific work.

Three cruises were undertaken by the Scottish Research Steamer "Explorer" into the Southern North Sea area across the line Berwick—Lindesnaes. The first cruise was carried out in April in the area between the Firth of Forth and the north edge of the Dogger Bank, the second cruise in September extended from the Firth of Forth to the Danish coast and included the Dogger Bank and Jutland Banks, and on the third

cruise in November the April observations were repeated. On all cruises trawling experiments were carried out with the standard commercial otter trawl with a fine mesh covering enveloping the codend. In addition to the routine observations made on all trawl catches, serial hydrographic data and plankton collections were obtained from the selected observation stations on the various itineraries.

As in former years in all countries fishing vessels afforded valuable assistance for biological work, and lightships and steamers plying on established routes particularly contributed to hydrographical studies.

The Severe Winter and the Mortality among Fish and Invertebrates.

The unusually cold weather in the first month of this year has obviously had a pronounced effect on the fish and other marine organisms. In different areas, particularly between the Gulf of Heligoland and the south-east coast of England, great quantities of dead fish were taken in March and April, among which there were many dead or dying soles; besides the number of soles caught alive was abnormally high in deeper waters, as these had left the shallower areas because of the cold to which part of them succumbed. A report on this and on the hydrographical conditions then prevailing has been published[1]). To supplement this some further reports from various co-workers are briefly given here.

Dead soles were taken by Danish cutters at 25—50 metres depth, especially in the rectangles L 8, M 7, and M 8, and at Lat. 56°15′ N. Long. 6° E. (S. of the Little Fisher Bank). Dead common crabs (*Cancer*) and web-footed crabs (*Portunus*) were washed up on the west coast of Jutland. In the coastal waters (Limfjord, Ringkøbing Fjord) a strikingly high mortality was observed among eels, flounders, cod, sprats, Zoarces, and black gobies[2]).

Off Heligoland the predominant feature in the plankton during the cold period was an outburst of the diatom *Biddulphia aurita*, a phenomenon which is well known from former cold winters and has been explained by Schreiber's culture experiments.

During the cruise of the "Poseidon" in May the temperature and salinity in the southern North Sea were in general below normal. The cold winter water, of low salinity, from the German Bight had moved off north of Heligoland in a northerly and north-westerly direction. The coldest water was found at the south-eastern corner of the 40 metre line (at about Lat. 55° N. Long. 6°40′ E.) at the bottom, where the temperature (2.89° C.) was still 3.1° and 1.1° C. lower than is normal in May and February respectively. Scarcely any soles were caught in the German Bight, and very few off the West Frisian Islands. At 23 trawling stations in the German Bight only 11 were caught as against 154 at the same stations in May 1924. Off Heligoland it was not until the autumn that a slight increase could be reported. In May in contrast to former years neither eggs nor larvae

[1]) J. R. Lumby and G. T. Atkinson, On the unusual Mortality amongst Fish during March and April 1929, in the North Sea. Journ. du Conseil IV, 3, 1929.

[2]) Comp. A. C. Johansen, Mortality among Porpoises, Fishes, and the larger Crustaceans during severe Winters in Danish waters. Rep. XXXV. Dan. Biol. Station. 1929.

of this fish were found on the spawning grounds in the German Bight, apart from some eggs on the East Frisian coast which were caught dead. In the outlets from the shallows and in the mouths of the rivers a surprisingly small number of plaice and flounder fry in the transitional stage were found. They still remained for the most part offshore and in the vicinity of the 40 metre line. In the cold water to the north and especially the north-west of Heligoland there were for this season unusually many eggs of plaice and cod.

At the young fish investigations inshore, it was noticed that the 0-group appeared late and that their length was at first less than usual. The abundant plaice year-class 1928 (I-group) had, however, apparently suffered no injury. The spawning of other fish had evidently been delayed. Whereas the cod larvae were numerous, there were no larvae or young stages of the whiting, which in May are normally very abundant[1]). The thornbacks (*Raja clavata*) which usually at this time migrate to the shallows still remained far out to sea.

It was also established in May that there had been a great mortality among the bottom animals. A surprisingly small number of common crabs (*Cancer*) were caught and of these almost half were dead. Also molluscs (*Solen*, *Cardium echinatum*) were found dead in masses. For further information see Section C. Benthos.

B. Fish.

I. General.

1. Statistics and Ichthyometrics. The collection has proceeded in England without change of method. The numbers of the chief species measured are approximately as follows:—

At sea.

Plaice	Cod	Haddock	Turbot	Brill	Soles	Total
542,000	25,000	206,000	5,000	2,000	27,000	807,000

On the Markets.

Plaice	Cod	Haddock	Total
57,000	2,400	10,100	69,500

All measurements of haddock made at sea have been placed at the disposal of the Fishery Board for Scotland.

Also in France the measurements were continued in the market at Boulogne and on board the trawlers "Nazareth" and "Adrienne"; they were carried out chiefly on her-

[1]) On the other hand according to French observations in March (17th—21st) unusually large numbers of gadidae eggs (cod, haddock, whiting) were found in the western regions on the Dogger Bank and West Shoal.

ring, cod, haddock, whiting, mackerel, and the gurnard species. A general report on the work was published[1]).

The following figures refer to the measurements made by the Heligoland biologists on the Research Vessels out at sea and at the young fish investigations in the vicinity of the coast.

	Plaice	Other Fish	Total
offshore	96,254	46,606	142,860
inshore.....	26,158	17,876	44,034
Total...	122,412	64,482	186,894

On April 1st measurements were started, in collaboration with the "Institut für Seefischerei" at Wesermünde at the suggestion of the Biological Institute on Heligoland, in the market and on the commercial fishing vessels, for the purpose of supplementing the investigations carried out on the Research Vessels. The number of measurements taken in the market at Wesermünde of landings from the southern North Sea are as follows[2]):—

Plaice	Cod	Haddock	Turbot	Sole	Other Fish	Total
4,508	1,610	4,369	182	1,026	3,840	15,535

In Addition to 1,631 measurements at sea.

2. Littoral Fishing. The Belgian investigations, referred to on p. 109 of the last report, have been continued, especially dealing with the young pleuronectids and the whiting.

Observations were made by English and French investigators on the young herring and sprats which occur frequently in the coastal zone.

On the German coast, the investigations were continued on the frequency, distribution, seasonal migrations, and the growth of the youngest year-classes of the flatfish species which live close inshore. An important object of this work, which was discussed in last year's report, has been to test whether important annual fluctuations can be shown to exist already in the 0- and I-groups, and whether they agree with those fluctuations which are noticed in the following years in the same year-classes which in the meantime have become the II-, III-, etc. groups, and have emigrated into the open sea. These investigations took place in the mouth of the Elbe (April, June, August, December), at Büsum (August, October, November), Norddeich (August, September), Föhr Island (August), Den Helder (May), and on the "Düne" near Heligoland (Jan.—March, May, June, Aug.—Oct., December). In all, 289 hauls of 10 minutes' duration each were made with the Johansen Trawl, in addition to a number of catches with other small

[1]) J. le Gall, Travaux à la Mer du Laboratoire de Boulogne pendant l'année 1928. Revue des Travaux de l'Office des Pêches. Tome II, Fasc. II.

[2]) The rest of the measurements and age-determinations in the market and the sea were carried out especially on haddock, cod, coal-fish, and Norway Haddock, originating from the northern North Sea, Iceland, and the Barents Sea in approximately equal quantities: in all 93,040 measurements and 4,134 age-determinations.

trawls and with the seine and push-net. Moreover 10,826 plaice of the 0-group, 15,332 of the I-group, 5,000 flounders, 9,566 dabs, and 3,308 other fish were measured and numerous age-determinations carried out on plaice. For the results relating to plaice compare Section IV No. 5. A demonstration of the methods of investigation took place at a meeting of Belgian, Dutch, English, and German research workers in May, on the occasion of a visit of the "Poseidon" to Den Helder. In addition to these investigations into the question of fluctuations and the biology of young fish, enquiries were recently set on foot by order of the Prussian Government into the market statistics of the catches made by the coastal fishermen, especially the shrimp catchers in the shallows, of young flatfish which are used for the manufacture of fish-meal. This kind of fishery is regarded in many quarters as a waste of young fish and as an injury to the stock, affecting the offshore fishery for marketable fish. In order to judge the extent and importance of this fishery, the species, number, and size of the captured young fish have been ascertained at the most important sea-ports by drawing up regular statistics on the quantity of the catches and by analysing samples from the catches.

Also in Holland investigations on the young flatfish were begun in July—August in the "Goereesche Gat" at the outlet of the "Haringvliet".

3. Eggs and Larvae. In Boulogne the sorting was continued of the abundant plankton material obtained on the cruises of the Fishery Patrol Vessels in the North Sea. The French research workers draw attention to the unusual frequency of the gadidae eggs (cod, haddock, whiting) which were found in the plankton in the area of the Dogger Bank and West Shoal during the voyage of the "Nazareth" on March 17th—21st 1929.

On the research cruises of the "Poseidon" and "Zieten" material was collected for the study of the distribution and quantity of the pelagic fish fry. Some results are given in the Section "Herring, Plaice, and other Fish". — In the Heligoland Aquarium the process of spawning and the first development of the eggs and larvae of *Zeugopterus punctatus* could be observed. Reports on this are in the press.

4. Food of Fishes. In England the examination of the large collection of herring stomachs and plankton samples from the herring grounds has been completed (see Section D. Plankton).

The French investigations on the stomach contents of various species of fish were carried out chiefly, as before, on herring, mackerel, and the gurnard species.

In Germany the quantitative investigations on the food of bottom fish were continued, first and foremost of the plaice in the eastern North Sea. The importance of the large *Nereis virens* as a food animal on the grounds off the North Frisian coast should be noted as this year's special observation; the larvae and young fish of the herring and other fish larvae were often found in the stomachs of whiting. A report on this is in preparation for publication. A publication has appeared dealing with the determination of the food value of bottom animals eaten by fish[1]).

[1]) K. Struve und W. Kairies, Die chemische Zusammensetzung einiger als Fischnahrung dienlicher wirbelloser Bodentiere der Nordsee. Wiss. Meeresunters. Abt. Helg. XVII, 6. 1930.

5. Marking Experiments have been undertaken only by Denmark (see IV 7).

6. Experiments with Saving Gears. The English experiments have been continued as regards the size of fish of different species passing through codend meshes of various sizes. This investigation was the main or secondary object on twelve cruises of the "George Bligh". — In addition, on one of these voyages tests were carried out on a Gelder saving cod end fitted with meshes of a size and material on which a large amount of data had been procured in relation to normal codends. A new method of increasing the releasing power of meshes was also tested. The bulk of the work has been carried out on haddock, but a good deal of data is available on other fish including plaice. The material is at present being worked up. — An English representative attended the tests of the Gelder saving gear carried out on the "Poseidon", and a French representative attended those carried out on the same gear on the "George Bligh". Two papers have been published during the year[1]).

Thanks to the support afforded by the Bureau, it was possible to carry out tests of the Swedish model and the Gelder model on the "Poseidon" in May. The experiments with the Gelder saving gear were carried out at Haaks Lightship in the presence of Belgian, Dutch, and English research workers, the inventor being also present with a saving gear lent by the Savings-Trawl Net Co. Ltd. As the size of the saving meshes of this particular gear was very small, it protected only the very small flatfish, but it sorted the fish very sharply, letting through, in accordance with the size of its mesh, almost all plaice and dabs up to 15 cm. in length.

The experiments with the Swedish model carried out on the young fish grounds at Amrumbank were considerably more extensive, many large catches of plaice being made. However the protective effect was very slight as far as the plaice were concerned, although for the less valuable dabs it was satisfactory. In all 45,711 plaice and 11,211 other fish were measured at the saving gear experiments.

The Dutch experiments with the Gelder trawl took place at the end of May on the trawler "Gerbrig" at the Monkey Bank, White Bank, off Heligoland, and at Borkum Reef.

In Belgium several saving-trawls were tried.

Full reports on the results of the experiments up to date in the North Sea were sent in to the Bureau by the Dutch, English, German, and Scotch experts.

7. Methods. A comprehensive account was published of the methods of the fishery-biological investigations on sea fishes[2]).

Papers were published by Messrs. Wollaston and Hodgson on a new method of treating frequency curves and by Mr. Graham on the collection and preparation of fish scales[3]).

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[1]) F. M. Davis, Preliminary note on experimental trawling with codend meshes of different sizes. Journ. du Conseil IV, 3. 1929.

H. J. Buchanan-Wollaston, The selective action of the Gelder codend and that of other codends compared. Journ. du Conseil IV, 3. 1929.

[2]) A. Bückmann, Die Methodik fischereibiologischer Untersuchungen an Meeresfischen. Abderhaldens Handbuch der biologischen Arbeitsmethoden. Abt. IX. Teil 6, 1929

[3]) See Footnotes p. 123 and 124, 2.

II. Cod and Haddock.

Racial investigations and age analyses have been undertaken by Danish investigators on cod from the western part of the Limfjord and adjacent parts of the North Sea.

As to the cod and haddock measurements in England, France and Germany ee B I 1.

On p. 112 of the last report, it was noted that an English report had been published iving an account of investigations into the methods for age and growth determination n cod. Those investigations had for their material a stock of young cod (age-groups I o III) which were located in the comparatively deep water of the Inner Herring Trawling round, where a thermocline is found in summer and apparently these fish reached a odal length of only $32^1/_2$ cm. at an age of $3^1/_4$ years. It is desired to know what the ge is at which the cod begins to be landed on the markets, in order that we may relate particular brood years the fluctuations shown in market statistics. Was this determnation for the Inner Herring Trawling Ground typical of the North Sea generally? his question has been investigated by means of old material of scales collected conmporaneously with the Herring Trawling Ground collection. Lest, however, differences the growth from year to year should lead them astray the investigators have also, rough observers on commercial boats, collected 22 samples of codling scales from ifferent parts of the North Sea in the second half of 1929. Scales were only taken when ere was a good haul of small codling. The material, old and new, comprises about 000 individual fish, arranged in 43 samples. By utilising to the full the implications the conclusions of the previous study (on the Inner Herring Trawling Ground) it s been possible to digest all the material in a short space of time, by the help of simifications in the technique of cleaning and mounting scales, of which the methods ve been briefly described[1]). Without anticipating the results of the new investigation f which the exact numerical conclusions as yet require checking) we may say that e new material shows very consistently that the growth found on the Inner Herring awling Ground is not typical of the North Sea generally, being abnormally slow.

On the German research cruises, material was collected as occasion arose for the e-determination of cod and haddock, in addition to the usual investigations on all didae caught. In May haddock were caught on the "Oyster Ground" and to the north Hanstholm in the Skagerak, among which latter the one-year-old fish (year-class 28, average length c. 20 cm.) were by far the most frequent. In the winter of 1929—30 surprisingly large catches of young cod were made near Heligoland. Age investigion on the statoliths of part of a catch (418 specimens, 157 kg. taken per hour in e cutter-trawl of "Augusta") showed that nearly all of these fish were at the end of eir second year of life (I-group), measuring from 21—40 cm., mode at 32 cm.).

In accordance with previous arrangements all measurement data of cod under cm. caught by the Scottish Research Vessel by otter trawl with small mesh covering er a long series of years have been tabulated according to the statistical areas of cap-

[1]) M. Graham, On the collection and preparation of fish scales. Journ. du Conseil, IV, 3. 339. 1929.

ture and placed at the disposal of the English Ministry of Fisheries for more detailed analysis. — The excursions in our area by the "Explorer" were designed mainly to extend the more intensive haddock investigations made further north and to repeat the observations of the previous year. All haddocks caught by trawl were measured and copious scale samples were obtained for age-determinations. The data are also being used as an aid to the analysis of the ichthyometrical haddock data collected by the Ministry of Fisheries. — Although the 1928 haddock brood was numerically strong in its first year — equalling, if not exceeding, that of the 1923 brood — it was distributed mainly along the northern and western sections of the North Sea and was poorly represented in the south-easterly and shallow areas. The results of the cruises in 1929 therefore confirm previous findings, namely that the extent of dispersal of a brood in its first year determines to a very large measure its distribution in the next one or two years.

III. Herring.

1. Statistics and Analyses of herring catches (Composition in terms of length, age-class, sex, maturity, etc.). In England the investigation begun in 1923 has been continued and during this year 29 samples from the east coast were examined for age, length, and maturity. The rich 1921 and 1924 year-classes were very pronounced during this season. A report which is shortly to be published contains the results of growth investigations and research on the "0"-group, as well as the age and growth of the adult herring and the race investigations. In September, a forecast of the autumn fishing was given in the "Fishing News". It was shown that there were signs of a good fishery off East Anglia and this proved correct[1]). A separate paper has been published on the methods used[2]).

The French investigations have been carried out chiefly on the herring of the southern part of the North Sea and the eastern part of the English Channel (Dyck-Sandettie, Calais-Antifer). These herring were examined for length, age, growth, and maturity. The 1929 population was characterized in these two areas by a great frequency of five-year-old herring (39.1 per cent.), and of seven-year-old (18.2 per cent.) and eight-year-old (10.8 per cent.), but there was a scarcity of six-year-old herring (12.8 per cent.) whilst the four-year-old in the stock were represented in normal proportions (10.2 per cent.). The influence of the different brood years in the composition of this population is evident from the following, confirming the French results set forth in 1929[3]).

[1]) W. C. Hodgson, Prospects for the East Anglian Autumn Herring Fishery in 1929. Fishing News, Sept. 28th, 1929.

[2]) H. J. B. Wollaston and W. C. Hodgson, A new Method of Treating Frequency Curves in Fishery Statistics. Journ. du Conseil, IV, 2. 1929.

[3]) J. Le Gall, Statistiques biologiques et considérations sur la population harenguière de la Manche orientale, Rapp. Proc.-Verb. LXV, p. 150 et seq.

Idem, Remarques et Statistiques biologiques sur les Harengs de la Mer du Nord et de la Manche et de l'Atlantique. Revue des Travaux de l'Office des Pêches. Tome II, Fasc. IV.

Poor Year-classes	Good Year-classes
1919	1921
1920	1922
1923	1924
1925 (normal)	1925 (normal)

In the study of the herring, which in Germany is carried out mainly by the Fishery-Biological Department in Hamburg, attention was centred chiefly, although not exclusively, on the herring forms of the southern North Sea. The investigations carried out on the cruise of the "Poseidon" in October in the region of the Dogger Bank and the neighbouring herring grounds formed a continuation of the previous cruise undertaken in Aug.—Sep. 1928 in the northern fishing area (Fladenground). The German catch statistics were worked up as before, attention being again especially devoted to the herring catches with trawl. Detailed reports were published in the periodical "Der Fischerbote" and in the "Jahresbericht über die deutsche Fischerei"[1]). The record yield of the German trawl herring fishery in 1928 was followed in 1929 by new record figures (nearly 70 million kg.). This result is to be ascribed in the main to improved fishing technique. This has therefore been carefully studied with a view to further possibilities of development[2]). A new herring trawl was tested on the "Poseidon". — Moreover the fishing areas of the German drift net fishery were worked out, as in former years, with the help of a great number of day-books placed at disposal by such captains as keep logs, and the charts published[3]). The analysis of those stocks which form the chief basis for the German herring fisheries in the western North Sea was continued, and the changing composition according to year-classes was ascertained. As in previous years, a number of representative samples were analysed for this purpose for length, sex, maturity, and age, the 16 samples worked up comprising some 1,600 individuals which were partly market samples from the Fladenground and the Dogger Bank, partly samples sent upon request from Lowestoft and Boulogne-sur-Mer, and partly captured by the "Poseidon" in October. The account given by Dr. Lissner at the Conference in London in 1929 for the years 1922—1928, which was published in the Rapports et Procès Verbaux LXV (1930), p. 134, was rendered considerably more complete by the addition of the analysis of 1929.

In Holland a fairly comprehensive material from the Flemish Bight was examined for age, consisting of 3 samples (in all 924 fish, in 4.2 per cent. of which, however, the age could not be determined) caught in November 1929 with Scotch nets at Smith Knoll. Five-year-old herring (of 1924) were represented most numerously (32.3 per cent.); four-year-old fish (of 1925) being fairly normal in abundance (18.3 per cent.), but those of six years (of 1923) rather scarce (11.6 per cent.).

[1]) H. Lissner, Die deutsche Trawlheringsfangsaison 1929. Der Fischerbote, XXII. Jahrg. Heft 4. 1930.

H. Lissner, Die Schleppnetzfischerei auf Heringe. Jahresbericht über die Deutsche Fischerei 1928. Berlin 1929.

[2]) H. Lissner und H. Fick, Zur Technik der Schernetzfischerei. Der Fischerbote, Jahrg. XXI, Heft 18. (1929).

[3]) H. Lissner, Die Deutsche Grosse Heringsfischerei im Jahre 1928. Ber. D. W. K. V, 1.

3. Young Herring. Two voyages of the "George Bligh" were mainly devoted to investigations on young herring in the coastal area.

The French observations on the 0-group have been regularly continued. Apparently these young herring abandon the coast here at the end of January untill February, at a time when they have attained a length of 13—16 cm.

4. Location of spawning places and larval Herring. The Danish investigations in the area of Jutland Bank and Little Fisher Bank as to the spawning places and intensity of spawning of the autumn-spawning herring have been continued. In the last half of September 1929, some Bank Herring were spawning in the neighbourhood of Little Fisher Bank. Several "spawny haddock" were taken there.

The position of the spawning places during the winter of 1929 were determined by the French co-workers by means of the data obtained from herring in Stage VI during the fishing season in the eastern English Channel and on the southern banks of the North Sea, and also by studying the intestinal contents of the other fish caught in the same regions.

Observations on the quantity and distribution of the larvae were made on the "Poseidon" in May in the eastern North Sea, and on the "Poseidon" and "Zieten" in October over the western Dogger Bank and the neighbouring areas. — A publication of the results of the investigations carried out in December 1928 is in preparation. It may be mentioned that at the beginning of December in the entrance to the English Channel greater numbers of the smallest larvae (c. 7—9 mm. in length) were found than ever before in any other place. The greatest numbers (200—1000 per sq. metre) were found between the Lightships Sandettie and Varne, the centre being at the East Goodwin and off Dover, where over 97 per cent. of the larvae were possessed of yolk sacs. The direction of emigration was towards the eastern edge of the "Deep Water". In other areas the number was far smaller and the age higher: in the Smith Knoll area up to 12 per sq. metre with 3 groups of larvae of mean length c. 10, 17, and 31 mm.; on the "Oyster Ground" by the 40 metre line the larvae coming from the north-west numbered up to 36 per sq. metre (mean length 19 mm.); in the German Bight there were only a few older larvae (mean length c. 31 mm.). — In May 1929 large quantities of older larvae and transition stages of the Bank Herring were encountered in the German Bight, but only to the east of Long. 6° E., being particularly numerous off the North Frisian Islands in the coastal water of low salinity and in the mouths of rivers and shallows, especially in the Ems. Considerable quantities of the fry of a coastal herring which had just emerged from the eggs were found in the Sylt Shallows, but there were no young larvae in the Ems or on the Jutland Bank. The larvae in the Sylt Shallows had by June (after $5^1/_2$ weeks) grown about 7 mm. — The regular investigations on the occurrence of the herring fry near Heligoland were continued.

The Scottish cruises in April and November were undertaken to ascertain the extent of dispersal of the herring larvae south of the Firth of Forth. The September cruise was probably too early to note any marked southerly or easterly drift of herring

larvae from more northerly spawning areas. All clupeoid larvae captured at offshore stations or at stations on the Dogger Bank and further east were identified as sprats.

5. Study of Herring races. Racial investigations have been undertaken in Denmark on herring caught in the Limfjord and adjacent parts of the North Sea, including Jutland Bank and Little Fisher Bank[1]).

In England no "race" investigations have been carried out this year and the data already obtained have been worked up into a report which is shortly to be published.

Very detailed investigations have taken place in the Laboratory at Boulogne. By examining a large number of vertebral columns it was possible to determine with accuracy the mean values for the number of vertebrae, which had already previously been drawn up for the different areas of the southern portion of the North Sea and the eastern English Channel. The mean value for the herring captured south of the Somme has proved very constant from the mouth of the Somme to Antifer throughout the entire fishing season. The general mean value for this area amounted to:—

56,766; probable fluctuation $= \pm 0.10$.

In the area of Dyck and Sandettie the mean value has still remained very constant throughout the entire fishing season, the general mean amounting to:—

56.49; probable fluctuation ± 0.08.

On the other hand it has proved variable in the case of the herring from the catches in the area between Calais and the Somme during the fishing season, amounting to 56.37—56.87.

The general mean value amounted to:—

56.66; probable fluctuation ± 0.10.

The French investigators consider it probable — although it has not been possible to obtain confirmation through a hydrographical observation — that in the course of the winter of 1929 the herring from the southern North Sea (mean value of vertebrae 56.50) remained persistently on the grounds of Dyck or Sandettie, and only in rare cases were able to penetrate into the English Channel (usually as far as the mouth of the Somme). In the region Calais—Somme, whither these herring usually return, the herring population of the Channel Proper (mean value of vertebrae 56.75—56.80) predominated throughout the greater part of the season. This peculiar distribution is in the opinion of the investigators the consequence of special hydrographical conditions at the entrance to the Channel during the winter of 1929, conditions which unfortunately cannot be ascertained by investigations.

In Hamburg the racial investigations have been continued without interruption, material as comprehensive as possible from European and Extra-European waters

[1]) Cp. A. C. Johansen, The Aalborg Herring and its Importance to the Danish Herring Fishery etc. Rep. XXXV from the Danish Biological Station 1929.

being utilized; they are based up to the present on 115 samples comprising some 9,500 individuals; a publication is in preparation. In a publication which appeared in 1929[1]), which is closely connected with the racial studies, it is shown from an abundant material of young stages of various origin to what an extent differences in the development of local forms are perceptible. Attention is particularly devoted to ascertaining in what manner and at what point in time the features of the skeleton which are used for distinguishing the races appear during development, with a view to judging to what an extent external influences may be admitted to affect their development. The anomalies observed in the axial skeleton and the fin-skeleton have moreover also been dealt with in detail.

At the Dutch investigations based on the material, mentioned above, originating from the Flemish Bay the keel scales between the ventral fin and the anus were counted, in order to test whether real Channel Sea (Lowestoft-) herring were represented. This seems, however, not to have been the case (number of these keeled scales in all 3 samples 14.9) so that the question as to the whereabouts of this race in recent years still awaits solution.

6. Food investigations. See D. Plankton.

IV. Plaice.

As in previous years the chief object was to ascertain with accuracy the changes occurring in the stock, by means of regular measurements and age and growth investigations at sea and on the market.

1. Statistics and Ichthyometrics. The routine work of measuring plaice on board commercial vessels at sea and also of the various trade categories recognised on the market at Lowestoft and Grimsby has been continued. Market and statistical investigations were started this year at Wesermünde as well as measurements at sea on board German trawlers. The numbers measured in England and in Germany are given in Section B I 1.

2. Age-Determinations. In the catches with fine meshed trawl (Eeltog) in the western part of the Limfjord and adjacent parts of the North Sea in May and September the Danish investigators found the abundance of the different classes as follows:—

Year-class	1926	normal
—	1927	—
—	1928	rich

Further age analyses have been carried out on plaice caught with the Danish seine on the Southern Horns Reef Grounds at depths between 10 and 20 metres (see IV 3).

[1]) W. Schnakenbeck, Entwicklungsgeschichtliche und morphologische Untersuchungen am Hering. Ber. D. W. K. V, 2. 1929.

Three cruises of the "George Bligh" were devoted to the capture of plaice in order to collect otoliths for growth rate calculations and the study of fluctuations in abundance of the various brood years. The line of stations from the Leman ground to the Haaks Light Vessel was trawled in May and November; the entire catches of 3,372 and 1,082 plaice respectively were measured and otolithed. In both periods over 50 per cent. of the plaice were of the II-group (year-class 1927). — In May and November, approximately the same grounds were trawled as in 1926, 1927, and 1928 in the vicinity of the Danish, German, and Dutch Coasts. The following numbers of otoliths were obtained.

	May	November
Near Horns Reef	143[1])	702
Near Graa Dyb	587[1])	691
Off Sylt	409[1])	407
Off Heligoland	78	682
Schiermonnikoog Ground	585	654
Near Haaks Light-Vessel	651	494
Total...	2,453	3,630

The total number of plaice otolithed in 1929 in the course of the above-mentioned research cruises was 10,537.

The proportion of the various age-groups showed considerable variation in the different areas. In May at the Haaks Light Vessel and near Schiermonnikoog the majority were of the II- and III-groups (1927 and 1926 year-classes). Off Sylt and in Graa Dyb the IV-group (1925 year-class) predominated but the I-group was nearly as strong at Graa Dyb. At Horns Reef three quarters of the fish were of the I-group, while near Heligoland the VII-group (1922 year-class) was the most abundant with a secondary mode at the IV-group. — In November the II-group was still predominant at the Haaks Light Vessel, but at Schiermonnikoog, the I-group was more numerous. The IV-group showed the highest proportion at Horns Reef and Graa Dyb, whilst off Sylt the I-group accounted for 54 per cent. of the catch and the IV-group held second place. Off Heligoland the III- and IV-groups made up the greater part of the total.

The work of tracing the effect of fluctuations of the young stock on the landings of plaice on the market at Lowestoft has been continued and augmented. The fish were weighed, measured, and otolithed. The numbers were as follows:—

1929	Extra Dead Small	Dead Small	Best Small	Small Medium	Best Medium	Large and Best	Total
April	..	1,659	395	364	388	217	3,023
July	185	588	351	374	335	173	2,006
October	486	520	335	251	316	200	2,108
December	..	994	215	257	330	251	2,047
Total...	671	3,761	1,296	1,246	1,369	841	9,184

[1]) Excluding the otoliths of fish of less than 10 cm.; a sample of which from each station showed them to belong to Age-Group I.

The material has not been worked up for December, but for the earlier periods it has been completed and related to the catch per 100 hours fishing from the Port. The great majority in all three periods, both by number and weight, consisted of plaice of the III- and IV-groups (1926 and 1925 year-classes) with a secondary mode of the VII-group (1922 year-class) thus confirming the previous results of the otolith cruises which showed that the 1922 year-class was more abundant than those of 1923 and 1924. The April catch per 100 hours fishing was exceptionally high for all age-groups. But this abundance was temporary since it fell considerably in July, and by October approximately two-thirds less by number and half the weight were taken per 100 hours than were taken in April.

Also in Heligoland the regular age control was continued for the purpose of studying the fluctuations and the growth rate. The number of determinations was again considerably increased. The material was collected by the "Poseidon" and "Augusta", the times, areas, and quantities being as follows:—

February, Hever Section	1,398
March, Hever Section	2,553
May, c. 10 transverse sections to the coast, from the West Frisian Islands to the Skagerak	16,034
June—July, Norderney Section	789
July—August, Heligoland	2,523
September, Heligoland	2,529
September, Hever Section	2,616
October, Norderney	2,182
Total...	30,624

As far as it was possible to judge, the abundance of the separate year-classes was as follows:—

Year-class	1925 (IV)	good
—	1926 (III)	bad
—	1927 (II)	probably normal (at all events better than 1926).

A report on the results of the observations in 1929, which deals both with the state of the year-classes and with their distribution in the different areas of the south-eastern North Sea, has been published in the Journal du Conseil Vol. V, No. 1. A further publication, which will shortly be appearing in the Reports of the German Scientific Commission, deals with the results from an older material of age-determinations, insofar as it lends itself to the perception of fluctuations.

Altogether, up to the present the Danish, English, and German investigations at sea on the state of the year-classes seem to present a picture of somewhat the following nature, although of course crude and given here only as a general guide.

Year-class.....	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928
Haaks W. Frisian coast	good	good	very good	very good	bad	normal	good	normal —good	good	very good?
E. Frisian coast and Heligoland	good	good (>1919)	good (<1920)	very good	bad	bad	normal (>1926)	normal (<1927)	good	very good?
N. Frisian coast, Horns Reef Grounds	normal	very good— good	normal	very good	normal	bad	very good— good	normal	normal	very good?

The conditions are not always similar in every area, since in the area of Haaks and the West Frisian Islands they differ at times from those in the East Frisian area, and especially the conditions in these two areas differ from those prevailing in the grounds off the North Frisian Islands and at Horns Reef.

The "Explorer" visited the region off the Danish coast in September and collected useful data of plaice in the form of measurements and otoliths for comparison with the Scottish East Coast stock.

3. Rate of Growth. The average size of the various year-classes of plaice caught by the Danish investigators with the seine on the Southern Horns Reef Grounds in 10—20 metres was in April as follows:—

Year-class ...	1927	1926	1925	1924	1923
Age-group ...	II	III	IV	V	VI
Average length, cm.....	16.4	20.4	22.2	24.6	25.5
Numbers of spec. invest.....	30	114	715	14	3

The large size of the II-group should be regarded in relation to the selective action of the net.

So far as the co-workers on Heligoland could ascertain from investigations, the rate of growth proved to be still on the whole increasing slowly, as has been the case since 1923. Up to the age-group II the mean length is again almost as great as before the period of protection afforded by the war; this does not, however, apply to the older groups. On the Norderney section the mean length of the age-groups was noticeably greater than off the North Frisian coast. This may perhaps be partially due to the abundance of food in 1928 off the East Frisian Islands which was communicated in the last report (Rapports et Procès-Verbaux LX, 1929, p. 117). A good rate of growth was also found at Hanstholm.

4. Seasonal Distribution of the Stock. In February and March to the north and north-east of Heligoland (Hever Section) an unusual distribution was noted, the bulk of the plaice remaining — probably on account of the particularly severe cold — at a great distance from the shore in deep water. The bottom temperature was only

about 0° C. until the 20 metre line was crossed. In May on the other hand the distribution was again normal on all the sections investigated by the "Poseidon" in the south-eastern North Sea, the manner of distribution proving to be in very close accordance with that which was noted on the previous May cruise (1924).

5. Investigation of younger stages. A report has been already given on this (see B I 2). The most important result of this year relating to plaice is the fact that the abundance of the 1928 year-class, which was observed last year in the 0-group everywhere along the German coast, has also been maintained in a high degree in the I-group both here and in the neighbouring areas. The results of the investigations on the manner of distribution and the fluctuations of the young plaice stock on the German coast will be dealt with in a publication at present in course of preparation.

6. Food of plaice. Already discussed in Section B I 4.

7. Marking experiments have been undertaken from Denmark with 700 specimens in April and September; 275 specimens were marked in the North Sea off Thyborøn at 15 metres, 425 in the Limfjord[1]).

8. Races of plaice.

9. Saving gear. Sufficiently mentioned above (Section B I 6).

V. Other Fish.

Flounder. Material for age-determination was collected from most of the flounders caught on the research cruises conducted by the Heligoland Institute.

Gadus luscus. A summary of our knowledge up to the present of the biology of this gadoid was published[2]).

Gurnards. The investigations on the biology of the most important species of gurnards were continued in Boulogne. The following result was obtained by determining the mean value of the vertebrae of the species:—

Trigla lyra	32.28
— corax	34.00
— lineata	34.75
— pini	36.82
— gurnardus	37.97

[1]) Cp. A. C. Johansen, Om Rødspættens Indvandring fra Nordsøen til Limfjorden og dens Tilbagevandring til Nordsøen. Dansk Fiskeritidende No. 20, 15. Mai 1929.

[2]) P. Chevey, Le Tacaud (*Gadus luscus*). Résumé de nos connaissances actuelles sur ce poisson. Revue des Travaux de l'Office des Pêches. Tome II, Fasc. II. 1929.

At the present stage of the work no clearly pronounced difference in the mean value of the vertebrae can be found between the gurnards of the North Sea and those of the Atlantic. The increase in the mean value of the vertebrae of the different species of this family, corresponding to the increasing geographical latitude in the distribution of the species, is none the less a noteworthy fact.

Mackerel. The concentrations of mackerel in the Channel at various times of the year have been the subject of special investigations on the part of the French research workers for a general study of the scombrids.

Sardines. The first results of the investigations continued in Boulogne were published[1]).

Sole. A publication has appeared on the fluctuations in the sole stock of the German Bight[2]). In consequence of the severe cold in the first months of the year only very few soles were captured in the German Bight (cp. "Preliminary" above). From the scanty material it appears that — as was to be expected — the 1924 year-class in this year provided the chief part of the spawning stock, whose spawning, however, was delayed and in the German Bight was apparently only on a very small scale, as a large part of the fish had emigrated or succumbed to the cold. In the autumn stock of young fish off Heligoland the 1926 year-class predominated, which had already previously been noticed as above the average. Owing to the small catches only 330 scale samples in all could be worked up; a further c. 100 samples were purchased in the market at Wesermünde.

Sprat. Sprat investigations have been carried out in England for the first time since the war, and this work, which began in November, is at first in the nature of an experimental survey. 12 samples were examined up to December for age, length, and maturity, and growth calculations with special reference to the length l_1, are giving consistent results. The samples were taken from an area from Lowestoft to Torquay but the main bulk came from Brightlingsea and Deal. The young sprats in the Thames whitebait have also been sampled. — Preliminary percentage fat determinations have been carried out.

A number of samples from the north coast of France were investigated in the Laboratory at Boulogne.

Samples of sprat taken on the German cruises in the Southern North Sea were placed at the disposal of the Laboratory in Bergen. The investigation at present in progress there has up to the present given the result that the young sprats of the German Bight in November show the same variation in size as is the case in Norway: i.e. between 3.5 and 8—9 cm. There are different size groupings among the young fish of the same year-class, showing a difference between the means of 2—2.5 cm., which suggests a very protracted spawning time. The number of vertebrae amounts to c. 47.60.

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[1]) J. Le Gall, Contributions à l'étude de la sardine des côtes françaises de la Manche et de l'Atlantique. Revue des Travaux de l'Office des Pêches, Tome I, Fasc. II. 1928.

[2]) A. Bückmann, Fluktuationen im Seezungenbestande der Deutschen Bucht. Rapp. Proc.-Verb. LXV. 1930.

Thunnus thynnus. The results of the French investigations have been published[1]).

Moreover the study of other species of fish was promoted by the Laboratories in different countries.

VI. Shellfish.

In England an inquiry was undertaken as to the suitability of the Wash for oyster culture, and an investigation was carried out as to the composition and condition of the catch of crabs on the North Norfolk Coast.

In Boulogne measurements were taken of *Pecten maximus*, and studies undertaken on the conditions of fishing for this shellfish on the banks of Vergoyer and in the coastal area of Boulogne.

In the North Frisian Shallows the observations on the pelagic oyster fry were continued. A report will appear shortly in the "Wissenschaftliche Meeresuntersuchungen, Abt. Helgoland" Vol. 18. The experiments in the artificial breeding of oyster fry were continued in the Laboratory at List (Sylt), and of lobster fry on Heligoland.

C. Benthos and Deposits.

Preliminary work started in Ostende as to the action of the discharge of harbour-mudd dredgings on bottom fauna.

An important paper on the geology of the sea bottom in the Channel was published by a French investigator[2]).

Benthos study was continued by the Heligoland Institute along the lines laid down in last year's report.

In May investigations were carried out on the bottom population off the West Frisian Islands, in the German Bight, and off the coast of Jutland. The West Frisian area showed great similarity to the East Frisian. Patches of young *Mactra subtruncata* were encountered off Ameland. There also occurred abundant patches of this shellfish (50—1700 per sq. metre) to the north of Hanstholm (at a depth of 25—54 metres).

The regular investigation of the "Valuation Area" off the East Frisian Islands took place in May and October. In May the population had decreased to a minimum, probably on account of the particularly cold winter. The shellfish *Mactra subtruncata*, masses of which had been noted in September 1928, had thus almost completely disappeared, and at the inshore stations no echinoderms (with the exception of *Asterias*) were to be found. *Echinocardium* had fallen a victim to the cold to a greater extent than any other. The numbers of the crustaceans had also decreased considerably. On

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[1]) J. Le Gall, Le Thon rouge (*Thunnus thynnus*) en Mer du Nord et dans l'Atlantique du Nord Est. Revue des Travaux de l'Office des Pêches. Tome II, Fasc. III. 1929. (Aussi: Journal du Conseil, Vol. IV, No. 2. 1929).

[2]) L. Dangeard, Observations de géologie sous-marine et d'océanographie relatives à la Manche. Annales de l'Institut Océanographique. Tome I, Fasc. I. 1929.

the other hand *Tellina baltica* which occurs inshore had maintained its numbers with numerous young ones. In October again the population was much more abundant than in May. Especially the worms had increased (in particular *Lanice conchilega*, *Scoloplos armiger*, in places also *Pectinaria koreni*). A number of *Mactra subtruncata* of the 0-group were again present close inshore (18.5 per sq. metre). In September 1928 in a narrowly restricted spot (Lat. 53°44′1 N. Long. 6°43′8 E., 17 metres) an extremely richly populated patch of *Mactra subtruncata* with numerous worms was encountered (3,710 live animals per sq. metre, gross weight 5,257 grams). In May 1929 there was no particularly dense population at this same spot. In October 1929, however, it contained a large quantity of worms (especially numerous *Scoloplos armiger* and *Lanice conchilega*), together with starfish (6,920 live animals per sq. metre, gross weight 1,897 grams); these animals had all established themselves here in the course of this summer. This still unexplained phenomenon may perhaps be ascribed to an aggregation of plankton brought about by currents, which had deposited the larvae which were ready to attach themselves. The neighbouring stations of these thickly populated spots contained only 1 or 4 per cent. of the gross weight. Only in the offshore stations had the echinoderms developed again more strongly in October. There were still no *Echinocardium* close inshore where the echinoderms were represented chiefly by *Ophiura*.

A publication dealing with the fluctuations of *Mactra subtruncata* in the "Valuation Area" during the years 1925—1929 is in the press and will appear in the Ber. D.W. K. Further material was collected from all the trawl catches for the purpose of working up the "Epifauna".

D. Plankton.

No plankton cruises were undertaken during 1929 from England. The year has been occupied in the examination of the extensive plankton material in hand. The examination of the large collection of herring stomachs and plankton samples from the herring grounds, collected during 1926 has been completed, and the report on these is almost ready for publication. A report on some observations of the fat content of the plankton of these collections has been published[1]).

During the French herring fishery, plankton observations were made, as before, in the southern part of the North Sea and in the Channel.

On the research cruise of the "Poseidon" in May, plankton observations were made in connexion with the catches of fish fry, as were also further experiments on the efficiency of various vertical nets. The results of the investigations, which were carried out on behalf of the International Council, were published[2]).

On the "Explorer", plankton collections were obtained from the selected observation stations on the various itineraries.

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[1]) R. S. Wimpenny, Preliminary Observations on the Fat content of the Plankton on the English Herring Grounds in the North Sea. Fish. Invest. Ser. II. Vol. XI. No. 5. 1929.

[2]) Cl. Künne, Vergleich der Fangfähigkeit verschiedener Modelle von Plankton-Netzen. Rapp. Proc.-Verb. Vol. LIX. 1929.

E. Hydrography.

England. During the entire year without cessation, drift indicator work has been in train on the two English Lightvessels Varne and Cromer Knoll. An unbroken record of results from the Varne for about four years is now available, and the successive three day records have been massed into the form of imaginary records relating to the individual months, the individual seasons and the individual years falling within the period of the experiments. The records obtained in the months and seasons of like name but of different years, have been massed, and those values of the water flow between English Channel and North Sea characteristic of the various months and seasons have been worked out. No further report on this continuous current measuring work in Dover Straits has been published during the year.

The continuous current measurements recently carried out by means of a Drift Indicator on the Inner Dowsing Lightvessel, and to the cessation of which in favour of Cromer Knoll Lightvessel reference was made in the report for 1928 have been worked up and published[1]). The publication deals with records collected during an observation period of 777 days. Various experiments from the research vessel "George Bligh" both in the Channel and North Sea with new types of floating bottles have been made in selected areas in connexion with particularly interesting problems.

Surface observations of salinity and temperature have been continued in the North Sea, English Channel, and North Atlantic on the same routes and Lightships and with the same frequency as in 1928. The complete list is as follows:—

North Sea.	Approx. Frequency of Sampling.
Shields—Oslo	9 samples a week.
Hull—Hanstholm	do.
"Smith Knoll" L.V.	Sample every fourth day.
English Channel.	
"Varne" L.V.	do.
Newhaven—Dieppe	3 samples a week.
Southampton—Havre	5 and 4 samples in alternate weeks.
Southampton—St. Malo	do.
Plymouth—Guernsey	do.
Liverpool—Charente	9 samples a fortnight.
(Under the supervision of the Marine Biological Association, Plymouth.)	
"Seven Stones" L.V.	Sample every fourth day.
North Atlantic.	
English Channel—West Indies.	30 samples a month.
English Channel—South America	do.
(in collaboration with the Meteorological Office.)	

[1]) J. N. Carruthers, The Flow of Water past the Inner Dowsing Lightvessel. (53°20′ N—0°35′ E.). Fish. Invest. Ser. II. Vol. XI. No. 6. 1929.

All the salinity titrations were carried out at the Government Laboratory. Hydrographic observations were made from the Research ship "George Bligh" on 4 cruises during March, June (2), and September. On the second cruise in June, the "George Bligh" worked in conjunction with H.M.S. "Cherwell", continuing the investigations on Salinity Distribution and Residual Currents. Quarterly cruises were made by the m.s. "Evadne" (Dove Marine Laboratory) in the neighbourhood of the Northumberland coast.

Notes have been published on the hydrographical conditions in the Southern North Sea during March and April during 1929[1]) and in the region between the Dogger Bank and the Yorkshire coast[2]). A surface sampler designed for observations of temperature alone has been described[3]).

France. The observations have been made chiefly during the herring fishery on board the Inspection Vessels "Sentinelle" and "Estafette".

Germany. A. Regular observations:—

1) Surface samples (temp. and sal.) were taken in Heligoland roadstead on the same day as on the lightships, i.e. every 3 or 4 days, once at each high tide and once at each low tide.
2) At the stations around Heligoland, which had previously been regularly investigated, temp. and sal. samples were taken fortnightly at 0 m., 10 m., and at the bottom.
3) On the Lightships Borkumriff, Norderney, Weser, Bremen, Minsener-Sand, Elbe 1, Elbe 4, Ausseneider, and Amrumbank once every 3 or 4 days at high tide and once at low tide temp. and sal. samples were taken at 0 m., at Borkumriff also at the bottom.
4) On the occasions of the regular sailings of the Cuxhaven—New York liners, (Hamburg—America Line) the temp. and sal. were also determined in the North Sea.
5) On the lightships enumerated above under heading 3) the direction and velocity of the surface current were, as before, measured every 4 hours.

The data referred to above under headings 1), 2), and 4) were sent to Copenhagen for publication in the Bulletin hydrographique. The data obtained on the lightships were printed as fully as had been the case formerly in the years 1926 and 1927.

B. Special observations were made on the cruises of the "Poseidon" in May and October, and of the "Zieten" in October, mentioned above in the Section "Work at Sea", also as occasion arose on the cruises of the "Augusta" in the German Bight.

Holland. The observations of temperature and salinity were continued on three Lightships and on the steamer routes Flushing—Harwich and Rotterdam—London.

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[1]) J. R. Lumby and G. T. Atkinson, see Footnote p. 13.

[2]) J. R. Lumby, in: M. Graham, Studies of Age-Determination etc. Fish. Invest. Ser. II. Vol. XI. No. 2. 1929.

[3]) J. R. Lumby, A Surface Sampler for Temperature Observations. Journ. du Conseil, IV, 1. 1929.

Norway. Weekly observations of temperature and salinity were made on the steamer routes Bergen—Newcastle and Bergen—Rotterdam.

Scotland. Serial temperature and salinity observations were taken at all stations visited. The records of the extraordinarily low temperature found to the north of the Dogger Bank area were communicated immediately to the Ministry of Fisheries (England). A series of surface drift bottles were liberated in September in the area between the Dogger Bank and the Danish coast.

TRANSITION AREA
1929.

By

A. C. Johansen.

The most important investigations in the Transition Area in 1929 have concerned Plaice, Cod, Haddock and Herring but also other species of Fish have been the object of investigations, such as Flounder, Dab, Witch, Sprat, Mackerel, Sea trout, Eel etc.

As regards Plaice the following subjects have been investigated through co-operative work:—

a) The age-composition in the catches of plaice in the Kattegat, the Belt Sea and the Baltic.

b) The abundance of the youngest year-class (0-group).

It was noted that the year-class 1927 constituted a great item in the western and southern Kattegat and the Belt Sea both in the catches of the fishermen and in the catches from the research steamers.

The year-class 1929 was, in the northern and middle Kattegat, somewhat less abundant than normally, and it was very sparsely represented in the south-western Kattegat, the Belt Sea, the Sound and the western part of the Baltic proper, including the southern coasts of Sweden (Fig. 1).

The year-class 1928 was (as I-group) more numerously represented in the catches at the coasts of the Baltic than the year-class 1929 (Fig. 2).

Fishing experiments for Herring fry with a 2 metres stramin ring-trawl were carried out from Denmark, Germany and Sweden in the month of October. The area covered was part of the Kattegat, the Belt Sea and the western and southern Baltic including the Pommeranian Bay and the Bornholm waters (Figs. 3 and 4).

The Autumn Herring of the North Eastern Kattegat.

Only a few stations were taken in the north eastern Kattegat. Most of the catches were small, but at a single station, S.E. of the Kobbergrund about 2,800 specimens were taken in a 30 minutes' haul.

The Autumn-spawning Belt Herring.

The catches of larvae in the south western Kattegat and the Great Belt were small as in the autumn of 1927. In 1926 and 1928 the catches were much larger.

The Sound Herring.

Great catches of larvae were taken in the waters between Falster, Møen and Rügen, especially East of Falster and North of Rügen. Considerable numbers of larvae were also taken in the waters between Fehmern and Buk, N. of Oderbank and W. and N. of Bornholm.

The investigations have shown that in 1929 as well as in 1926 the catches of larvae were greater in the waters between Falster, Møen, Zingst and Rügen than in the waters between Sealand, Møen and Skåne. In 1925, 1927 and 1928 the catches in the two areas were about equal.

The Autumn-spawning Strømming.

The catches of larvae in the Hanö Bay were very small.

Denmark.

The vessels used for investigations were as follows:—

1) s.s. "Japetus Steenstrup" from the beginning of April till the end of October.
2) The motor cutter "Ebba" in April.
3) A motor boat from July till October.

Plaice.

A series of fishing experiments with a small fine-meshed otter-trawl ("Tog") were carried out from s.s. "Japetus Steenstrup" in the Kattegat, Belts, Western Baltic and the western part of the Baltic proper in the months of April—October.

As in the preceding years the greatest population of young plaice was found in the north western Kattegat, especially in Aalbæk Bay and on Herthas Flak. The I-group and II-group (the year-classes 1928 and 1927) constituted here the main part of the catches, and especially the II-group was an important item in the catches also in the other waters.

In the month of April and beginning of May, a series of experiments with the transplanting of young plaice from the Horns Reef grounds to the Belt Sea, the Western Baltic, the Isefjord and the Sound, took place. The transplantation comprised about 1,047,000 fish of a length between 18 and 26 cm. and a total weight of 107,000 kilogrammes. In order to obtain information as to the growth and migrations of the fish, 100 fish were marked at each of 28 different places where the fish were set out. At the same places the same number of local Baltic plaice (100 at each place) were marked and liberated.

The marking experiments have shown — as did the corresponding experiments

g. 1. Number of Plaice of the 0-group (year-class 1929) taken per 30 minutes' haul with a young plaice trawl near the coasts in the summer and autumn of 1929.

1928 — that the plaice introduced from the North Sea have had a very quick growth, namely about 10 cm. in the period April—May till the end of the year. This growth was 2—3 cm. greater than that observed in the Baltic plaice of the same size in the area in question.

The plaice planted in the Belt Sea in 1929 and in 1928 have, on the whole,

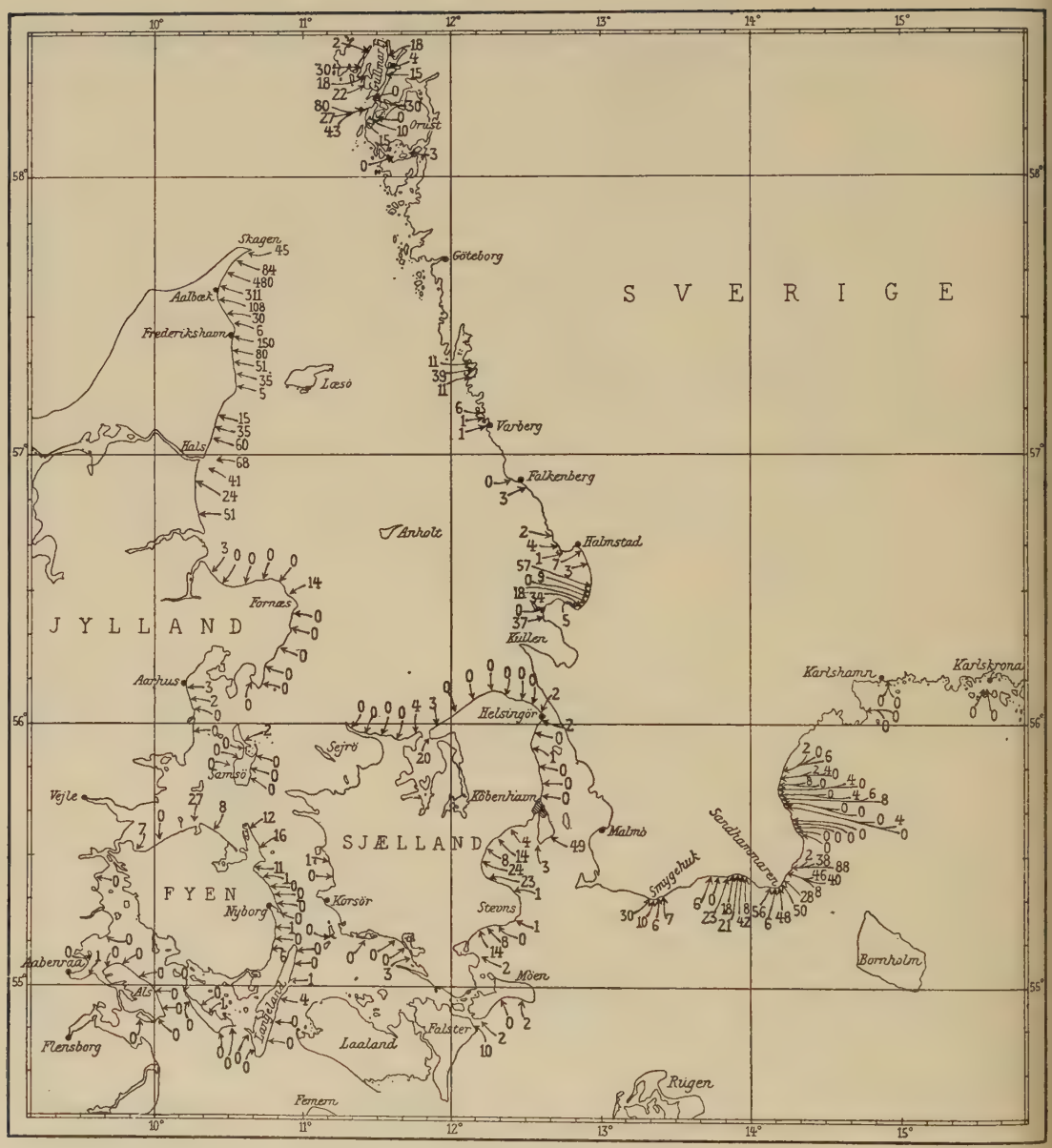

Fig. 2. Number of Plaice of the I-group (year-class 1928) taken per 30 minutes' haul with a young plaice trawl near the coasts in the summer and autumn of 1929.

been rather stationary. The plaice set out in the Western Baltic and the Baltic proper have shown a more marked tendency to undertake long migrations towards more saline waters than those set out in the Belt Sea and the southern Kattegat.

There has been a marked difference in the percentage of recaptures in the two series of experiments, but the difference was not nearly as great as that observed in the

corresponding experiments in 1928. Until the end of December 1929 the following percentage of the fish marked in 1929 was recaptured:—

	Transplanted North Sea plaice		Local Baltic plaice	
	No. marked	% recaptured	No. marked	% recaptured
Belt Sea	2100	24.2	2100	54.7
Western Baltic	200	5.5	200	27.5
Isefjord	200	63.0	200	67.5
Sound	300	38.0	300	69.3
Total...	2800	27.1	2800	55.2

The great difference in the percentage of recoveries suggests that the mortality caused by other factors than fishing operations has been greater in the transplanted fish than in the local Baltic plaice, but part of the difference is probably due to the fact that the transplanted fish are not quite as stationary as the local Baltic fish.

On the whole, the transplantation experiments in 1929 have given very satisfactory results, and there is reason to believe that the transplantations will be resumed on a commercial scale.

Preliminary notes on the results of the transplantation experiments in 1928 and 1929 are published by A. C. Johansen in "Dansk Fiskeritidende" of July 24th, 1929, and in "Fiskerens Lommebog" for 1929.

Flounder.

Investigations as to age, maturity and food were carried out in 1929, especially in the Belt Sea.

The main part of the flounders taken during the fishing experiments with Tog in the western Kattegat and the Belt Sea, belonged to the year-classes 1927 and 1926.

Dab.

Investigations of age, growth, maturity and food of the common dab (*Pleuronectes limanda* L.) were carried out during the year 1929, especially in the Belt Sea. Particular attention was paid to the 0-group, its occurrence, growth and food; furthermore, material was collected in order to elucidate the question, "have all specimens of the dab's 0-group formed growth-rings in their otoliths before the end of the winter"? The investigations will be continued in 1930.

Cod.

Experiments with ring-trawl and Hensen net were undertaken in April and May 1929 in the Kattegat, Belt Sea and Western Baltic to ascertain the abundance of the cod larvae.

Fishing experiments with Tog were carried out in the Kattegat, Belts and Western Baltic in April—October in order to ascertain the abundance of the youngest year-classes of the cod. The cod fished were subjected to analyses as to age, length, sex and food.

The results of the Danish investigations during recent years, concerning the abundance of the various year-classes of the cod in Danish waters, have been dealt with in a preliminary communication by Erik M. Poulsen: "On the Fluctuations in the Abundance of Cod Fry in the Kattegat and the Belt Sea and Causes of the same". Rapp. et Proc.-Verb. Vol. LXV. 1930.

In the Laboratory at Hellerup samples of cod from different parts of the Danish waters have been analysed as regards age, length, sex, maturity, food and racial characteristics.

Haddock.

The investigations regarding haddock in the Belt Sea and the Western Baltic have shown that the haddock larvae introduced in the Belt Sea and the Western Baltic during the saltwater inflow in the summer of 1928, have grown up in these waters.

In April and May 1929 a few haddock larvae were taken in the Belt Sea and the Western Baltic with ring-trawl.

Herring.

The racial studies of the herring in the waters around Denmark have been continued. The following paper has been published on the subject:— A. C. Johansen: "The Aalborg Herring and its Importance to the Danish Herring Fishery from the XVI Century until the Present Day". (Report of the Danish Biological Station XXXV. 1929.)

The location of spawning places, by means of fishing experiments for the tiny larvae with Hensen net and 2 metres stramin ring-trawl, were continued in April, May and October.

The influence of the size of the stock of cod upon the yield of the Herring fishery has been studied by Aage J. C. Jensen, who has published a paper on this subject in "Meddelelser fra Kommissionen for Havundersøgelser", Serie Fiskeri Bd. VIII, Nr. 8, 1929.

A preliminary communication "On a correlation between the yearly catch of Herring in the Sound and the abundance of Herring larvae in autumn" has been published by A. C. Johansen in Rapp. et Proc.-Verb. Vol. LXV. 1930.

Mackerel.

A forecast as to the yield of the fishery in the Kattegat etc. was published by Aage J. C. Jensen in "Dansk Fiskeritidende" for May 29th, 1929.

Sea Trout.

The investigations regarding size, age, growth and maturity of the sea trout taken in the Gudenaa and Randers Fjord have been continued.

The marking experiments with sea trout in the rivulets of Bornholm have been continued, 81 specimens being marked in the rivulet Öleaa in January and April of 1929.

Eel.

A forecast as to the yield of the fishery for silver eels in Danish waters was published by Aage J. C. Jensen in "Dansk Fiskeritidende" for August 28th, 1929.

The severe cold in the first months of the year 1929 caused a considerable mortality among the invertebrates of the Littoral Region as well as among Porpoises and several species of Fish, such as Eel, Black Goby, Cod, Flounder, Sprat etc. The following papers have been published in Report XXXV of the Danish Biological Station (1929) on this subject:—

H. Blegvad: Mortality among Animals of the Littoral Region in Ice Winters.
A. C. Johansen: Mortality among Porpoises, Fish and the larger Crustaceans in the Waters around Denmark in severe Winters.

Plankton.

Quantitative investigations with plankton nets of fine gauze were undertaken once a week from three Danish light vessels, Anholt Knob, Schultz's Grund and Halskov Rev. At the same time vertical hauls with Hensen net for the capture of fish eggs and larvae were made.

Hydrography.

As in the previous year the hydrographical investigations have been undertaken in connection with the biological investigations of the Danish Commission. The observations consisting of measurements of temperature, salinity and oxygen, will be published in the Bulletin Hydrographique.

The measurements of temperature and salinity carried out by the Danish Meteorological Institute at different stations on the coast and from Danish lightships at different depths have been continued. The observations are published in the Nautical Annual of the Institute.

Germany.

Plaice, Flounder and Dab etc. (Dr. S. Strodtmann).

In the first months of 1929 the hatchery for plaice eggs at Schilksee near Kiel was completed under the supervision of Professor von Buddenbrok, and the assistants of the Commission carried out a series of preliminary investigations in order to discover and rectify any possible defects.

In April a research cruise was again made with the Government Research Steamer "Poseidon". The investigation was devoted as on previous occasions to the fish stock, especially to the spawning of the flatfish, to fish eggs and larvae, to observations of the hydrographical conditions, and to continuing the bottom valuation. Kiel Bay, Neustädter Bay, and the Kadet Channel, in the Western Baltic were especially investigated. The chief part of the time occupied by the cruise was spent on investigating the Arcona, Bornholm, and Danzig Basins, particularly, however, the Oder Bank. A report on this is in the press.

Throughout the entire year investigations on the changes in the flatfish stock in the Baltic were continued, and considerable progress was made in the assembling of the total material collected up to date. A short report by Dr. Kändler on the further development of the plaice stock in Mecklenburg Bay in 1926 and 1927 is also in the press. It is shown that the rejuvenation of the plaice stock, which Strodtmann and

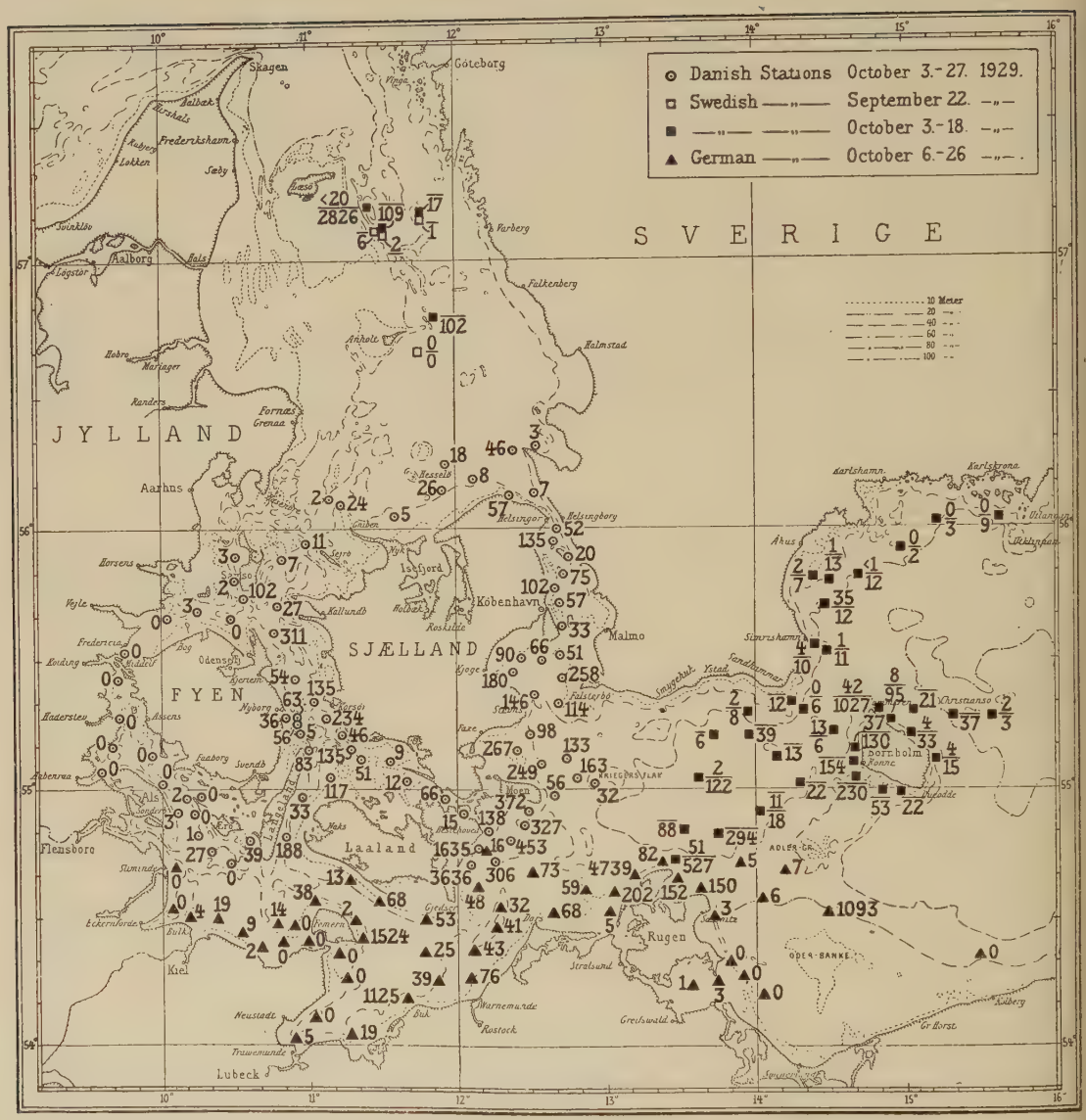

Fig. 3. Total Number of herring larvae taken per 30 minutes' haul with a 2 metres stramin ring-trawl in October (and September) of 1929. Where two figures are given at one Station, the upper figure indicates catch in the upper layer, the lower figure catch in the lower layer. The Danish hauls were "step-hauls".

Langhammer in their publication have exhaustively proved to take place, has progressed, and that the growth rate has further increased.

The same phenomena are now manifesting themselves very distinctly in the flatfish stock of the central Baltic. It has become more and more evident that also the accumulated flatfish stock, which congregates each year in the Bornholm Deep for the

Fig. 4. Number of herring larvae of less than 10 cm. taken per 30 minutes' haul with a 2 metres stramin ing-trawl in October (and September) of 1929. Where two figures are given at one Station, the upper gure indicates catch in the upper layer, the lower figure catch in the lower layer. The Danish hauls were "step-hauls".

rpose of spawning, has now become greatly thinned out, and that the growth rate ot only of the plaice but also of the flounders and dabs has considerably increased. hrough the numbers of the adult fish having greatly diminished, the character of the erman flatfish fishery has altered very much. It has become more and more devoted the capture of young fish.

In the course of years a very comprehensive material has accumulated which proves that these phenomena are in causal connexion with each other. It has been worked up under the following aspects:—

1) Changes in the flatfish stock as shown by the analyses of biological catches; recourse has been made to some extent to a hitherto unpublished material obtained from the cruises of the "Poseidon" in 1904—1905, in order to include the starting point of a development which was in full swing in 1925 when the investigations from the "Poseidon" were resumed.
2) Age and size compositions of marketable catches and the changes in the course of recent years brought about by the changes in the stock, which had previously been shown to be taking place.
3) The effects on the fishery yield, produced by the changed stock and the changed method of exploiting it. Particular attention was devoted in this connexion to the fluctuations which occur; the more the fishery becomes a young fish fishery, the more the fluctuations influence its yield.

The thorough working up the total material along these lines will also take up the whole of the year 1930.

The investigations concerning the proportion between males and females of the plaice in the catches in the Western Baltic have been continued by Geheimrat Henking, and a paper dealing with this question is being worked out.

Herring (Geheimrat Henking).

The investigations concerning the distribution and frequency of the larvae of the autumn spawning herring were continued. Dr. Altnöder undertook from October 6th—26th a special expedition with a motor cutter, extending from the Kiel Bay to the Pommeranian Bay. The usual gear, viz. a 2-metres stramin ring-trawl was used. The great number of larvae taken in the waters between Fehmern and Buk, North of Rügen and North of Oderbank were of special interest. In the Kiel Bay only a few larvae were taken (see Figs. 3 and 4).

Norway (Mr. Paul Bjerkan).

Mr. Bjerkan has continued his studies on the Sprat in 1929, and Mr. Alf Dannevig has continued his investigations regarding the abundance of the 0-group of the Cod in certain of the Norwegian fjords as well as his rearing experiments with cod and lobster.

Sprat (*Clupea sprattus* L.).

No special sprat expedition was undertaken in the Oslo-fjord and environments in the season 1929. During the rich fishery which took place particularly from the end of May to the middle of July, fourteen samples, in all, were taken for statistical and biological investigation. These samples showed that the fishing had been carried out among a population composed almost entirely of yearling sprats, year-class 1928. The majority

consisted of large sprats of fine quality. As is often the case there was an intermixture of shoals of small sprats, which was particularly prevalent in the inner portions of the fjord, in towards Oslo. The difference in the average size of the two size types was, towards the middle of July, not far from 1 cm., the larger being from 10.2—10.5 and the smaller from 9.4—9.5.

At the fishery at Hvaler during December 1929 and January 1930 sprats from 5.5 to 15 cm. occurred. The majority of sprats was then also of the 1928 year-class, but among them were a number of older sprats (year-class 1926 and 1927) and fry of 1929.

By a count of vertebrae, of 198 specimens from Hvaler, a mean figure of 48.06 was obtained. The corresponding figure for year-class 1928 was about 48.7 and for year-class 1927 about 48.00.

Cod (*Gadus callarias* L.).

The 0-group of the cod fish and its abundance. In order to ascertain the abundance of the cods' fry in the coastal waters it is usual, in September, to make an expedition between Kragerø and Mandal. Certain fjords and certain places of the skerries at particular localities are drawn every year with a young fish trawl. Hydrographical material is, at the same time, collected. This, in the case of certain fjords, is supplemented in June and November.

The investigation of the growth of the cod, and the variation in the abundance of the older year-classes is continued at three places on the coast. In connection with this a number of investigations into the reliability of the age-determinations are carried out.

The hatching of cod was rendered difficult by the very severe winter. Spawning cods were not procurable. The result of the hatching was only a fraction of the normal, 20.8 million fry and 8.5 million eggs were put out on the stretch, Tromøsund—Grimstad.

Lobster (*Homarus vulgaris* M. Edw.).

The investigations in connection with the increase of the lobster and the importance of raising the minimum size are being continued.

The collection of accurate reports of the catches of lobsters, from fishermen along the Skagerack coast, from Kragerø to Mandal, has been started. At certain places permission has been given for the catch of small lobsters in order to get a reliable graph of the size of the lobsters.

Rearing of lobsters. The work of rearing lobsters during the summer was successful, 46,200 young lobsters were put out at the bottom stage. This corresponds to 30 per cent. of the number of newly hatched fry dealt with.

The lobster fry were put out in the immediate vicinity of the hatcheries.

Sweden.

Biological Investigations (Dr. K. A. Andersson).

In conformity with the programme laid down by the Transition Area Committee the Swedish investigations were focussed mainly on the plaice, haddock and herring.

As regards the plaice the principal object was to investigate the necessity for protection of this fish in the Kattegat and Skagerak. As for the herring and haddock attention was directed chiefly to the collecting of knowledge and data which might afford the basis of predicting, if possible, the prospects of fishing in the near future. The expeditions with the research vessel "Skagerak" were also planned in accordance with this programme of investigation.

The research vessel "Skagerak" was kept in commission for the greater part of the year. The following is a brief outline of the cruises accomplished in this area and the main object of the work in the different parts of the year:—

January—March: Studies of the distribution and abundance of herring in the Kattegat and Skagerak in order to assist the fishermen in finding the herring shoals; trawling experiments for studying the stock of haddock.

July—August: Trawling in the Skagerak for studying the stock of haddock and witch (*Pleuronectes cynoglossus*).

August—October: Investigation of the distribution and frequencies of the young stages of plaice, flounder and herring in the Skagerak, Kattegat and the southern Baltic. In this Area also the stock of plaice was studied.

November—December: Cruises in the Skagerak and Kattegat for studies on the stock of herring and haddock.

Herring.

At many stations in the southern Baltic and in the Kattegat investigations were made in order to ascertain the distribution and abundance of young herring larvae. It may be mentioned that young larvae were very abundant east off the island of Læsø in the Kattegat, where in a 30 minutes' haul 2,800 young larvae were caught (see Fig. 3).

A number of herring samples from different parts of the Transition Area were examined.

During the year 1928 the herring fishery in the Sound and off the south coast of Sweden was based essentially on the year-class of 1924, the catches being fairly abundant. In 1929 the same year-class predominated in the catches, but the yield was much less than in 1928. The brood of 1924 evidently was on the decline. That such a dwindling of the catches was about to occur, could however be anticipated (cf. the publications cited below).

On examining the possibility of making prophecies concerning the herring fishery within the coastal waters in question, it proved that the study of the density of the various year-classes, and the quantitative studies of the occurrence of young herring larvae supplemented one another adequately. By a correlation of the results of these two sets of investigations a better survey could be gained with regard to the forecast of the yield of the fishery.

Even among the herring races which choose the Kattegat and Skagerak for their spawning grounds in the autumn, the year-class of 1924 was still prominent, rendering the catches during the winter season of 1928—1929 more abundant than those of the

preceding year. As late as the fall of 1929 the same year-class predominated the catches, being five-year-old herrings of a very fine quality. In some of the samples 3-yearlings were also fairly numerously represented.

Studies of racial characters were carried on besides, showing that Norwegian spring-spawning herring could be found in the eastern part of the Skagerak.

Haddock.

During the year under review a great deal of work was spent on studying the haddock stock in the Skagerak. The haddock stock and fluctuations of same form an object of particular interest on the part of the fishermen. The prominent year-class of haddock, the brood of 1926, which abounded in the catches towards the end of 1928, presented a length of 31—33 cm., disappeared at a rapid rate from the eastern parts of the Skagerak, and even from the waters near the Skaw, at the beginning of 1929. Probably this haddock, which should have its first spawning period in the spring of 1929, has migrated farther westward, where the principal spawning areas for the haddock are found. In 1929, the brood of 1928, which seems to be very abundant, constituted the mainstay of the Skagerak stock. The other year-classes are now very sparsely represented in the Skagerak.

At the fishing harbour of Gothenburg statistical data have been collected throughout the year concerning the different sizes of haddock landed at the harbour.

By closely observing the composition of the stock as to year-classes a prediction of the prospects of haddock fishing in the coming periods will be possible, the attempts made in this direction in Sweden having proved fairly successful (cf. publications cited below).

Plaice.

In the Bohuslän fjords investigations of the plaice were continued, the distribution of the 0- and I-groups in these waters being the object of particular studies. These later investigations were extended to comprise also the coastal waters of the Kattegat. The catches were made by means of a fine-meshed young fish seine, the gear thus slightly differing in construction from the youngfish Trawl employed by Dr. Johansen for a similar purpose, though almost corresponding to same in respect of capture capacity. Cruises in the outer waters of the Gullmar Fjord and in the Ellös Fjord yielded very rich catches of plaice of the 0-group. In the Stig Fjord, which usually harbours a richer stock of plaice than the other fjords, particularly in its inner waters, individuals of the 0-group were very sparse. Even the inner waters of the Gullmar Fjord and of the Åbyfjords yielded considerably less abundant catches of the 0-group than did the outer tracts of these waters. The data collected on these Swedish expeditions for the study of the plaice off the west coast of Sweden are under preparation and a report will be submitted to the International Council.

In the southern Baltic a repetition of last year's investigations concerning the distribution of the 0-group of plaice off the coasts of Skåne and Blekinge was conducted in September—October. The results arrived at proved that matters were, largely, like

last year. Plaice was totally absent off the coast of Blekinge, the 0-group being even very sparsely represented to the north of Simrishamn, while individuals of the I-group were still found fairly regularly upwards the boundaries of Blekinge. Last year, however, individuals of the 0-group were found also near the mouth of the Helge River. Concurrently with these investigations trawling expeditions were undertaken in the waters around the Isle of Bornholm and in the Arcona Basin, in which parts the stock of plaice seemed to be very poor.

The figures 1 and 2 show the distribution of the young plaice of the 0-group and the I-group near the coasts.

At the new Laboratory for Fishery Research at Lysekil experiments concerning the influence of variations in salinity and temperature upon the growth of plaice, the ring-formation of the otoliths, and racial characters, have been resumed.

Flounder.

Also for the flounder last year's investigations were resumed this autumn with regard to the occurrence of the 0- and I-groups in the coastal waters of Skåne and Blekinge. The two groups were found to be well represented along the entire coastal tract, individuals of the 0-group being, however, less abundant than the previous year; this was most apparent in the waters off Blekinge.

Witch.

In the summer season of 1929, in the month of July a number of hauls for witch eggs and larvae were made in the waters between Hanstholm and Hirtshals. Witch eggs were, however, not obtained although this district no doubt affords a spawning ground for the witch, if only on a minor scale. Racial studies on the witch in the Skagerak and Kattegat were continued concurrently with the collection of otoliths for age and growth determinations. In the Gothenburg fishing harbour the collecting of statistical data concerning the landings in Gothenburg of differently assorted witch (large, medium or small-sized) was continued. The minimum size limit introduced for the catches of witch seems hitherto to have led to a considerable decrease in the catches, without its having as yet been possible to trace any direct improvement of the stock.

The results of the investigations thus carried on have been separately dealt with in the following publications:—

K. A. Andersson: Koljefisket i Skagerak och utsikterna för detsamma under den närmaste framtiden (The Haddock fishery in the Skagerak and prospects for same in the nearest future), Ny Svensk Fiskeritidskrift 1929. No. 8.

— Utsikterna för sillfisket i Öresund och vid Sveriges sydkust under instundande sillfiskesäsong. (The prospects for the Herring fishery in the Sound and on the south coast of Sweden during the coming season), Ibidem No. 13.

— Västkustens sillfiske under säsongen 1928—1929 (The Herring fishery in the Kattegat and Skagerak during the season 1928—1929), Ibidem No. 18.

Arvid R. Molander: Some Observations concerning the Stock of Haddock in the Skagerak and Kattegat, Journal du Conseil, Vol. IV, No. 3.

— Några anteckningar till rödtungans biologi i Skagerack och Kattegat (Notes on the biology of the witch in the Skagerak and Kattegat), Ny Svensk Fiskeritidskrift 1929. No. 11.

Hydrography (Prof. Otto Pettersson).

The chief object of the Swedish hydrographical investigations this year has been the study of the interchange of waters between the North Sea and the Baltic. It has generally been taken for granted that the excess of rain and riverwater over the water which evaporates from the surface of the Baltic tends to raise its waterlevel and thus sustains a hydrostatic pressure that causes an outflowing current through the Sound, the Belts and the Kattegat which is compensated by an inflowing undercurrent from the Sea. The same explanation would account for the interchange of waters in the Scandinavian fiords.

A closer study of this phenomenon in the deepest of the Swedish fiords, the Gullmarfiord, has led to another view of the question. The hydrostatic pressure of course exerts a certain influence producing a tendency of the surface water of the fiords and of the Baltic to flow out, but this is too feeble to account for the whole interchange of water between the basins of the Baltic and the Gullmarfiord and the ocean[1]). The force here in action is of cosmical origin. It is an effect of the tidal waves from the Atlantic which, when they encounter the discharge of lighter surface water from the Kattegat, dip under it and continue their course as submarine tidal waves into the fiords and into the Kattegat channel.

Every wave-front of the semidiurnal internal tide injects a quantity of more or less diluted seawater through the Belts into the outer basin of the Baltic, while the huge wavefronts of the parallactic tide occasionally can turn the direction of the outflow through the Sound in a contrary direction. Some papers dealing with this subject are ready for publication.

[1]) According to M. Knudsen, Jacobsen and R. Witting the outflow from the Baltic amounts to 450—480 cubickilometres a year. An exchange of water of this magnitude can not be caused by a hydrostatic difference of pressure of about 0.10 metres which is supposed to exist between the Baltic and the Kattegat.

BALTIC AREA
1929.

By

K. A. Andersson.

During the year under review the investigations by the participating countries were concentrated mainly on the herring, plaice, flounder, common dab and salmon, intensive studies being made of various aspects in the life-histories of these species. Further experiments have been made to study "saving gear", and extensive plankton and hydrographic work has been carried out.

The following is a résumé of the work carried out by the participating countries.

Denmark.

Biology.

Cod.

Age-determinations of cod from the Bornholm Deep were undertaken.

Mortality among Porpoises and Fishes.

Enquiries were made as to the mortality among porpoises (*Phocaena communis*) and fishes in the Bornholm Deep during the severe winter in January—April 1929. The ice around Bornholm seems to have been a catastrophe to the porpoises, as several hundred dead specimens were taken up in trawls by the fishermen after the ice had disappeared. Some dead eels were observed in the ice near the shores, but there did not seem to have been any great mortality among cod and flatfishes[1]).

Hydrography.

The Danish Meteorological Institute made daily observations of temperature and salinity at the surface at Christiansö by Bornholm. These observations will be published in the annual report of the Institute.

[1]) See: A. C. Johansen. "Mortality among Porpoises, Fishes and the larger Crustaceans in the waters around Denmark in severe Winters". Report XXXV of the Danish Biological Station. 1929.

Finland.

Biology.

Material for scale-analysis of Salmon from the Kemi, Oulu, Kymi and Kokemäki rivers was collected and marking of young Salmon in the Kemi and Kokemäki rivers was carried out.

Local plankton investigations were made at Tvärminne Zoological Station.

Hydrography.

1) Regular continual observations were made in the following ways:—
   a) Surface-temperature daily, surface-sailinity every 5th day, temperature and salinity at different depths every 10th day at 26 coast stations and 11 lightships.
   b) Surface-observations by liners from Finland to Denmark.
   c) Currents at three depths three times daily from 11 lightships.
   d) Oxygen in deeper layers at Märket three times a month.
   e) Registrations of sea-level at 14 coastal points.
   f) Records of ice conditions in journals and sketch maps at about 100 stations.
   g) Records of ice conditions in the Baltic by all Finnish ships.

2) A hydrographical cruise was made in July 1929 in the Baltic north of Gotland, during which 71 stations were taken. On this cruise chemical work comprising determination of oxygen, hydrogen-ion-concentration, alkalinity, nitrogen-compounds (ammonia, nitrate, nitrite) and phosphates were carried out.

3) Investigations regarding the mixing of water were carried out in the sea off Helsingfors.

4) Laboratory work regarding chemical methods of analysis of water- and bottom-samples was done.

5) Echo-Soundings were carried out systematically in the Bothnic from the North to about 63° N. L.

Germany.

In April a cruise was made with the research vessel "Poseidon" to the Arcona, Bornholm and Danzig basins with the main object of studying the stock of flatfishes, their spawning, and the frequency of their eggs and larvae. The Oder Bank was also investigated. Further hydrographical work and investigation for the valuation of the bottom were carried out.

During the year under review the changes in the stock of flatfishes in the Baltic were studied and it was ascertained, that the stock of these fishes in the Bornholm region becomes more and more rejuvenated.

A preliminary report on the changes of the stock of flatfishes in the eastern Baltic will soon be published by Dr. KÄNDLER.

In October a cruise was made in order to study the distribution and frequency of young herring larvae, and it is of great interest to find, that such larvae were very abundant in the region northwest from Rügen and north from the Oder Bank but were

not to be found in the region off Kolberg. A full report upon this work is given in the Administrative Report of the Transition Area Committee.

Salmon investigations were made by the Königsberg "Fischerei Institut" off the Samland coast and in the east Prussian rivers. It was ascertained that the Baltic salmon, for the most part, remained in fresh water for three or four years. The age of these fish lies between five and ten years. The most numerous are the 7 years old salmon. Among the east Prussian rivers chiefly the Memel is frequented at present. The ascent occurs during June to January, especially in November—December. A connection between the salmon brood set out and the fishes caught off the east Prussian coast cannot be seen from the statistics of the catches. Young salmon originating from various river districts were marked and set out in various east Prussian rivulets. In order to ascertain the migrations a special marking with salmon hooks was undertaken.

Latvia.

Biology.

The measurements of *Salmon* and the collection of salmon scales for the purposes of scale analysis were continued at several points along the rivers Daugava (Düna) and Salace (Salis). The examination of scales collected and of other materials regarding the distribution and migration of salmonids was carried out at the Fishery Laboratory of the Ministry of Agriculture, where also investigations of the spawning places of salmon fishes were commenced. Also experiments regarding the culture of salmon smalls in artificial ponds were continued and a great number of young salmon hatched for marking experiments. The results of the investigations of *Coregonids* have been published by Mr. W. Mannsfeld: "Studien an Coregonen des Ost-Balticums" (Archiv für Hydrobiologie, Vol. XXI). Researches about the distribution of *Pleuronectids* and other fishes along the Latvian sea-shore were started and in part published by the Fishery Laboratory.

Also investigations of fishes (*Coregonus albula* and other) were commenced by the Hydrobiological Station, cf. V. Ozolin: "Ein laichreifes Lumpenus Lampretaeformis Walbaum ♀ aus dem Rigaschen Meerbusen" (Fol. Zool. et Hydrobiol. Vol. I).

Plankton samples were collected at the hydrographical surface points and during the seasonal cruise of the states ship "Hydrografs" which have not yet been examined. The results of the examination of plankton samples collected in the year 1925 have been published by the Hydrobiological Station in the "Folia Zool. et Hydrobiol. Vol. I".

The works of the Commission for the investigation of the pollution of the river Daugava (Düna) by the town of Riga, established by the Municipality of Riga, where delegates of the Municipality, the University and the Ministry of Agriculture are participating, were continued.

Statistics.

Statistical work was regularly continued by the Board of Fisheries and Pisciculture of the Ministry of Agriculture as in former years. The data for 1928 are published

in the fifth statistical yearbook, edited by Mr. V. Miezis: "Bulletin statistique des pêches maritimes de Lettonie — Année 1928". The data for 1929 are ready for publication.

Hydrography.

By the Hydrobiological Station of the Latvian University (the Director, Prof. E. Strand) surface observations of the sea regarding $t°$ and $S.$ were regularly carried out on following lines:—

1) Riga—Kiel, observations once monthly at 24 stations.
2) Kiel—Danzig—Riga, observations at 22 stations,
3) Liepaja (Libau)—Riga, observations four times monthly at 11 stations.
4) Ainazi (Haynash)—Riga, observations nine times monthly at 5 stations.

These observations were published in the "Bulletin Hydrographique".

In the spring of 1929 (May—June) a seasonal cruise was carried out by the Hydrobiological Station on the Govt. ship "Hydrografs" in the Gulf of Riga and in the part of the Baltic, bordering the Latvian coasts. Observations regarding $t°$, $S.$ and O_2 of surface and deep waters were made at 17 Stations. The results of this cruise are published in the "Folia Zoologica et Hydrobiologica, Vol. I. Nr. 2"; where (Vol. I, Nr. 1) also the results of the seasonal cruise, carried out in 1928, have been published.

Observations of surface temperature were carried out by the States Meteorological Bureau (Ministry of Agriculture) regularly at the following coastal stations:—

1) Liepaja (Libau).
2) Ventspils (Windau).
3) Light-ship "Laima" (57°38′6 N. and 21°36′2 E.).
4) Kolkasrags (Domesnäs).
5) Mersrags (Markgrafen).
6) Bulduri (Bilderlingshof).
7) Daugavgriva (Dünamünde).
8) Ainaži (Haynash).

The data have been published by the States Meteorological Bureau in the "Meteorological Observations".

Also observations regarding the ice conditions in Latvian waters are regularly made by the States Meteorological Bureau from 10 points along the Latvian sea-shore. Summaries of those observations have been published by Mr. L. Slaucitajs "Beobachtungen der Eisdecke des Rigaschen Meerbusens vom Flugzeug aus" and "Spaltenbildungen in der Eisdecke und Eisschiebungen an der Küste des Rigaschen Meerbusens" in Annalen der Hydrographie und maritimen Meteorologie 1929) and "Die Eisverhältnisse an den Küsten Lettlands im Winter 1928—1929" (Arb. des Meteorologischen Instituts der Universität Lettlands Nr. 11).

Regularly data regarding the height of water level are compiled by the Hydrographical Department of the Ministry of Finances at the following stations:—

1) Ainaži (Haynash).
2) Salacgriva (Salismünde).
3) Daugagriva (Dünamünde).
4) Mersrags (Markgrafen).
5) Kolkasrags (Domesnäs).
6) Ventspils (Windau).
7) Liepaja (Libau).

The data of water level observations have been published in the "Bulletin Hydrographique". Also topographical measurements of the Latvian coasts, combined with measurements of profundity of the sea along the Latvian sea-shore are started by the Hydrographical Department.

The Hydrobiological Station, in co-operation with the Societies of Fisheries of Latvia, has carried out extensive investigations on the conservation of fishnets. The results of these investigations have been published in the "Swejnieku Wehstnesis" and will be continued.

Poland.

A fishery vessel, with a 70 HP motor, of the type used commonly by the fishermen on Bornholm was purchased in Denmark, provided with necessary instruments and adapted for scientific and fishery investigations. This constituted a new step in the organisation of sea research in Poland.

Fishery investigations.

1) A short study of the races of herrings occurring near the Polish coast was published.
2) The food of the flatfishes collected near the Polish coast was studied. 707 Flounders, 258 Common Dabs, and 134 Plaice of different age and sex were studied.

   In the young Flounders were found chiefly (in 63.5 per cent.) small crustacea; in larger ones chiefly molluscs (61 per cent.) as prevailing food. In the intestines of young Dabs were found chiefly (in 53 per cent.) large isopods (*Chiridothea*); in larger ones chiefly mollusca. The food varies in accordance with the age of the fishes, the nature of the bottom of the sea and the period of the year. These investigations will be published shortly.
3) Materials concerning the young stages of Flounders chiefly of the 0- and I-groups were collected. Young Flounders (from 10 mm. in length) were found near the shore since the month of August. I-group occurred from May. Very well marked individual variations in length (3—8 cm.) were observed. It is not improbable, that these variations are due to the length of the spawning period of these fishes.
4) A large quantity of otoliths of flatfishes was collected and studied. Serious doubts concerning the value of otoliths for age-determination arose during this study. The otoliths of one year old fishes were found sometimes not to be very different from those of the 0-group. The comparison between the scales and the otoliths sometimes gave divergent results: the otoliths of the structure corresponding to the 0-group were found in fishes having scales of the character of I-group. These studies will be prosecuted.
5) Marking experiments with Flounders were continued. From the marked Flounders liberated last year, besides some marks and fishes sent by the Polish fishermen, 10 marks and 7 marked Flounders were sent from Germany, Memel and Latvia. 5 Flounders were taken near (to N.) the Lighthouse of Stilo (at a depth of 10—12 m.); 1 Flounder to the N.W. of Stolpmünde (at a depth of 35 m.) and the rest was found

near Wittenberg, near Schievenhorst and near Schwasort in the neighbourhood of Memel. The change of weight of marked Flounder was very characteristic as is shown from the following figures:—

Number of mark	Weight when liberated gr.	Weight when refished gr.	Loss of weight gr.
324	115	102	13
283	70	40	30
577	42	35	7
141	105	48	57
671	150	125	25

All Flounders showed serious losses of weight in a period of about one year. All those specimens were taken eastwards or westwards from the Gulf of Danzig. This shows the better conditions of feeding in the Gulf of Danzig and near the Polish coast as compared with other parts of the Baltic Sea.

6) About 5000 Flounders and Dabs taken with ordinary industrial trawls were studied during the period from June to September. Every week about 300 fishes were studied; the sex, weight, dimensions and age (otoliths) were determined.

The II and III age-groups predominated; males were less numerous than females, especially among Dabs. The study permitted a determination of the average rates of growth of those fishes as is shown by the following table:—

Flounder.

	June 1929		September 1929		Gained in 4 months	
	cm.	gr.	cm.	gr.	cm.	gr.
II group.....	12.4	23.4	16.1	53.9	3.7	30.6
III group.....	16.0	51.1	19.0	83.9	3.0	32.8

Common Dab.

II group.....	11.6	22.0	15.0	42.0	3.4	20
III group.....	17.6	61.3	18.4	75.7	0.6	14.3

The number of fishes examined, was not sufficient to permit of general conclusions, but it is evident, that the excess of weight during 4 months corresponds roughly to the difference between the II- and the III-group.

7) The investigations concerning the influence of different parts of the ordinary trawl upon the composition of the total catch, were prosecuted. For these purposes a double trawl was constructed consisting of an inner part with large (55 or 45 mm.)

meshes and an outer part with small meshes (28 and 25 mm.). These two parts were firmly connected along four lines, so that it was possible to collect separately, from the outer sack, fishes escaping through the upper part, the bottom or the sides of the trawl. After 9 catches, 7000 fishes were measured. The fishes escaped through the meshes in all directions, but on an average 339 $^0/_{00}$ escaped through the upper part, 310 $^0/_{00}$ through the bottom part, and only 210 $^0/_{00}$ through the side parts.

8) The investigations concerning the saving trawl were prosecuted. It was found that the "saving trawl" must consist of a modification of the ordinary industrial trawl, but with wide meshes of suitable demensions permitting the fishes to escape through certain parts of the trawl. For different species of fishes, the wide meshes must be placed in different parts of the trawl.
9) Materials concerning the efficacy of different fishing gear used for the fishing of flatfishes were collected.
10) Statistical figures for 1929 were collected.
11) The researches concerning the Salmon and the Sea Trout were submitted for the report of the Limnological Committee.

Plankton investigations.

1) Comparative studies upon efficacy of Hensens- and Standard-Nets were begun.
2) Phytoplankton, especially the Dinoflagellates from the Polish coastal waters, and their distribution were studied, and the results were published.

Hydrography.

1) Surface temperature was measured daily in the port of Gdynia.
2) Temperature was measured every five days at a point, 4 km. distant from Hel, at 4 different depths. The figures from 1926—1928 were published in connection with a study of the influence of the winds upon the temperature of the water near the bottom of the sea.
3) The currents near the top of the Peninsula of Hel were studied by means of floating bottles. About 36 per cent. of the bottles cast out at 70 points were recovered, chiefly from the Eastprussian and Latvian coast. These studies will be prosecuted next year.
4) Periodic observations of the temperature and salinity at 10 points in the Gulf of Danzig, eastwards from the Polish coast were executed. The figures concerning 150 determinations of temperature and salinity were published in the Bulletin Hydrographique.
5) Observations and studies as to the influence of the water from the Vistula upon the water of the Baltic Sea were continued. The figures from the year 1911 to 1928 were used for this study.

Sweden.

During the year 1929 the investigations were carried out as far as possible in accordance with the programme adopted. They were concentrated mainly on the herring, salmon and plankton. Other species such as cod, sea trout, plaice, turbot, flounder and common dab were also objects of investigation.

The research vessels.

Investigations at sea were made by the motorboat "Eystrasalt" and the research vessel "Skagerak".

The following is a brief outline of what the cruises accomplished during the year and the main objects of investigation of the cruises:—

With the "Eystrasalt":—

June—October: several cruises along the Swedish coast. Fishing experiments for flatfish, collecting samples of herring for age-determination, the distribution of young stages of flatfish and of herring broods, plankton investigations.

With the "Skagerak":—

September and October: to the southern Baltic. Trawling for studying the influence of the fishery upon the stock of flatfishes. The distribution of broods of herring, plaice and flounder.

Herring.

The investigations regarding the herring were focussed mainly on the composition of the year-classes and the distribution of young larvae. A great number of scale samples were collected from different parts of the Swedish coast, and examined.

In the year 1928 the year-group from 1924 amongst the autumn spawners was relatively abundant along the Swedish coast. This was also the case in 1929. In the samples it predominated by 34—54 per cent.

It may also be noticed, that in 1929 spring spawners were relatively abundant and that of this race the year-group from the spring 1925 was rich, up to 72 per cent. Thus the autumn of 1924 and the spring of 1925 must have been favourable, as to the herring spawning.

In September and October a great number of hauls with a 2-meter ringtrawl were made in different parts of the Baltic in order to ascertain the stock and distribution of young herring larvae. In the Gulf of Bothnia and in the middle part of the Baltic the catches of herring larvae were small.

In the Bornholm region the catches of herring larvae were larger. A report of the catches from the southern Baltic is given in the Administrative Report of the Transition Area Committee.

Plaice.

In the cruise of September and October material was collected for further studies of the stock of plaice in the southern Baltic.

A great number of specimens from the commercial catches were measured.

Flounder.

In the Bornholm Area, in the Kalmar Sound and on the northern coast of Gotland investigations were carried out in shallow waters in July and August in order to find the youngest year-groups of the flounder. The 0-group seemed to be scarce. The I-group on the other hand was more abundant in all the localities investigated. On the coast of Gotland the 0-group had reached the bottom stage in the first part of August.

In the Bornholm region material was collected for further studies of the influence of the fisheries upon the stock of flounder.

A great number of individuals from commercial catches were measured.

Common Dab.

In the Bornholm region material was collected for studying the influence of the fishery upon the stock.

Turbot.

In June and July many fishing experiments were made for turbot in the Bornholm region and the Kalmar Sound. In the latter the catches were good. The turbot, on an average, were much smaller in the Kalmar Sound than in the Bornholm Area.

Cod.

Scale samples were collected from different parts of the southern and middle Baltic.

Salmon and Sea Trout.

During the salmon fishery in shallow water, in May, on the south coast of Sweden, the relative frequency and size distribution of salmon and sea trout in the catches was investigated. It was stated, that the salmon was caught in large numbers and that relatively few salmon — only 7—8 per cent. — were smaller than 50 cm. The fishermen also stated, that small salmon in the year 1929 were exceptionally scarce in the catches.

Scale samples were collected.

It was also stated, that there was no difficulty in distinguishing salmon from sea trout and that the fishermen, as well as the dealers, always distinguish both species.

Plankton.

Investigations as to the quantity of zooplankton were continued at a great number of stations in different parts of the Baltic and in different seasons.

A paper: "Investigations of Plankton and its fluctuations in the inner parts of the Baltic during the years 1925—27" by S. Vallin and Chr. Hessle is ready for printing.

Hydrography.

Hydrographical observations have been made in conjunction with the biological work as to salinity and temperature. The oxygen content has been determined at greater depths at different stations.

Continual observations have been made from light-ships along the Swedish coast. Off the northwestern coast of Gotland these continual observations have been carried out down to a depth of 80—100 m.